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THE HAWAIIAN PLANTERS' MONTHLY

PUBLISHED FOR THE

HAWAIIAN SUGAR PLANTERS' ASSOCIATION

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SUGAR PRICES FOR MONTH ENDING NOVEMBER 14, 1908.

	Centrifugals.	Beets.	Parity.
Oct. 12	3.98¢	9s 9d	4.04¢
" 13	3.95¢	9s 9¾d	4.06¢
" 14	3.95¢	9s 10½d	4.07¢
" 15	3.95¢	9s 10½d	4.07¢
" 16	3.95¢	9s 9¾d	4.06¢
" 17	3.95¢	9s 10½d	4.07¢
" 19	3.95¢	10s 3d	4.16¢
" 20	3.95¢	10s 4½d	4.19¢
" 21	4.03¢	10s 3¾d	4.18¢
" 22	4.03¢	10s 4½d	4.19¢
" 23	4.03¢	10s 6d	4.21¢
" 24	4.09¢	10s 3d	4.16¢
" 26	4.09¢	10s 2¼d	4.15¢
" 27	4.09¢	10s 0¾d	4.12¢
" 28	4.09¢	10s	4.11¢
" 29	3.99¢	9s 9d	4.04¢
" 30	3.99¢	9s 9d	4.04¢
" 31	3.95¢	9s 11¼d	4.09¢
Nov. 2	3.95¢	9s 11¼d	4.09¢
" 3	3.95¢	9s 11¼d	4.09¢
" 4	3.95¢	10s 1½d	4.14¢
" 5	3.95¢	10s 1½d	4.14¢
" 6	3.92¢	10s 1½d	4.14¢
" 7	3.92¢	10s 1½d	4.14¢
" 9	3.92¢	10s 2¼d	4.15¢
" 10	3.92¢	10s 3¾d	4.18¢
" 11	3.92¢	10s 2¼d	4.15¢
" 12	3.92¢	10s 3d	4.16¢
" 13	3.92¢	10s 2¼d	4.15¢
" 14	3.92¢	10s 3d	4.16¢

Messrs. Willett & Gray under date of October 22 and 29 report as follows:

October 22:

Raws.—It was quite correct of us to say last week that "all eyes were turned to the European markets," for from that direction continues to come the stimulating influences causing a phenomenal rise in values for this season of the year.

This rise for the week has been from 9s. 11¼d. to 10s. 4½d. for present month, and from 10s. 3¾d. to 10s. 9¾d. for May delivery for beet sugars.

Also, quotations here have been followed by sales from 3.96c. to 4.04c. per pound, 96° test Centrifugals.

The cause of the advance in Europe has been cabled from day to day, but may be summed up in the words of a special cable received by us today, viz.:

"European Beet crop reports are unfavorable and suffering from both drought and frost. The extent of damage is unknown. The freezing still continues, causing prospects of a smaller crop than last year."

Local business includes cargo of Java sugar due to arrive early in November, at 10s. 9d. c.i.f., 96° test basis, equal to 4.04c. per pound landed, and 10,000 bags Cuba Centrifugals for prompt shipment at 2⅝c. c. & f., 95° test basis, equal to 4.02c. to 4.05c. per pound, 96° test.

The estimates given elsewhere of decrease in carrying stocks September 1st as compared with last year, shows that actual production for the campaign year was less than the requirements for consumption of the same period.

Our crop estimates for the coming campaign give an increased production; but the events occurring abroad at the present moment indicate that reduced estimates may soon be in order, and as the margin of carrying stock on September 1st was comparatively small, it is evident that the trend of the campaign of next September is toward a further reduction of carrying stocks and a resultant increase in sugar values as the season progresses, with a possible temporary hesitancy during the earlier period of the Cuba crop distribution, as is usual, on account of lack of storage facilities in Cuba and for financial necessities; the latter, however, should not be so marked this season as it was last year, by reason then of general financial difficulties, which have no existence now.

A study of the several interesting and instructive features we give this week on the Cuba crop, Beet crop and World's production and consumption will prove of value.

Business in new crop Cubas, understood for January-February shipment, has been done at 2½c. c. & f., 96° basis, equal to 3.86c. landed.

Our Cane Crop Estimate.—In this number we give our preliminary estimate of the new cane sugar crops of the world for the season of 1908-09 by countries, amounting to a total of 7,247,000 tons, showing a net increase of 370,503 tons, as compared with the cane crops of last season.

The important changes are increases of 300,000 tons in Cuba, 15,000 tons in Louisiana, 15,000 tons in Demerara, 25,000 tons in Argentina and 30,000 tons in Mauritius, and decreases of 56,000 tons in Java and 101,000 tons in British India.

Our American Beet Crop Estimate.—We give in this number our preliminary estimate of the new American beet sugar crop for the season 1908-09 as being 440,000 tons, dependent upon suitable weather conditions until the close of the campaign. The indicated outturn is practically the same as the crop of last season, which amounted to 440,200 tons. The next change, however, in the estimate of the new crop is more likely to be a reduction than an increase.

New Cuba Crop Estimate.—The weather in Cuba for several months has proved to be very beneficial to the growing cane, which has now, to a great extent (although not fully) recovered from the effects of the long drought of the last two years. Progress has, also, been made in plantings, part of which were in time for harvesting during this coming season, but most of which will come into the following crop.

We have just received special reports from a large number of central factories located in the principal cane growing sections of the island, showing that the expectation is to grind an average of 17 per cent. increase in cane this season, if weather favors, which, on the basis of the poor, stunted cane of last season, would give a crop of 1,110,000 tons sugar.

But the growing cane shows a great improvement over that of last year, the present conditions being reported from different estates from 5 to 50 per cent. better, which should add to the yield 150,000 tons, even allowing for the possibility of the cane not being as productive as appearance would indicate, after experiencing a protracted long drought.

A conservative estimate of the new 1908-09 crop would, therefore, be 1,250,000 tons sugar, dependent upon continued favorable weather.

The production of sugar in Cuba last season was only 950,000 tons, because of the drought, but in 1906-07 the crop amounted to 1,427,673 tons.

World's Production and Consumption.—The new cane and beet sugar crops of the world give promise of a good yield, estimated to outturn possibly 378,303 tons more than those of last season. In the 1907-08 campaign the production was in tons: Cane, 6,876,497; European Beet, 6,532,000, and American Beet, 440,200; total, 13,848,697 tons; while for the new season (1908-09) the

estimates are: Cane, 7,247,000; European Beet, 6,540,000, and American Beet, 440,000; total, 14,227,000 tons.

The production last campaign, especially in Cuba, having been less than the normal, and the apparent consumption fairly good, the stock in principal countries on September 1, 1908, was reduced 221,012 tons to 1,043,306 tons.

The consumption this campaign year, unless checked by higher prices, should show a large increase over that of last year (especially in view of the recent depletion of invisible stocks), offsetting the increased production and leaving stocks of less than 1,000,000 tons next September, if the crop estimates prove to be approximately correct.

European Beet Crops.—Following is Mr. F. O. Licht's first estimate, in detail, of the European beet sugar production 1908-09, compared with actual outturn of the last five campaigns:

	Tons.	
	1908-09	1907-08
Germany	2,100,000	2,127,000
Austria	1,350,000	1,425,000
France	850,000	728,000
Belgium	290,000	232,000
Holland	190,000	175,000
Russia	1,300,000	1,410,000
Other countries	460,000	435,000
Total tons	6,540,000	6,532,000

October 29:

Raws.—The advance in prices which has been going on for some time in European markets, on account of unfavorable beet crop prospects through dry weather and frost, culminated during the present week, when beet quotations reached the high level of 10s. 5¼d., since when, under an improvement in crop conditions, the price has fallen 6d. to 9s. 11¼d. today.

While the improvement lasted our local markets sympathized to a certain extent and enabled the English holders of Java cargoes arriving here to realize at a considerably higher price than was promised a few weeks ago, such Java cargoes at the Breakwater having been sold in one instance at at least 10s. 11¼d. c.i.f., equal to 4.08c. duty paid for 96° test Centrifugals. The reaction in Europe, however, left two cargoes of Javas at the Breakwater unsold, which in the absence of buyers must be warehoused or sold at a reduction, which is at present unsettled.

The feature of the week has been the selling of a moderate quantity of new crop Cubas for December and early January delivery at 2½c. c. & f., 96° test basis, equal to 3.86c. landed, a portion of which is said to have been bought by United Kingdom speculators.

At the close, a considerable quantity for December/All-January and January/February shipment is offered on the same basis, while December/First-half-January are not offering.

Late today a sale was made of 10,000 bags old crop Cuba Centrifugals (which will be shipped promptly) at 2⅝c. c. & f., basis 96° test, equal to 3.98c. landed, establishing this figure as the spot quotation.

Mr. Otto Licht's beet crop estimate was given out at 6,600,000 tons, since when he has reduced his estimate for Germany alone 110,000 tons.

Mr. F. O. Licht's European beet crop estimate remains unchanged at 6,540,000 tons.

After a long period of reports from Mr. F. O. Licht of unfavorable weather, his cable message this week changes to favorable weather for working the crop, which accounts for the present decline in prices in Europe and which remains unchecked at this writing.

From Cuba, crop reports continue favorable.

We call attention to the figures given herewith of crop supplies and consumption requirements for the new campaign year, with their resultant figures of decreased stocks September, 1909.

As the European beet crop is still subject to weather conditions for some time to come, it is suggested in our European correspondence that a period of warm, moist weather, following the recent dry and freezing weather, would prove of serious damage to the beet crop, in which case the present reaction in values would be followed by a stimulated upward movement again.

World's Production and Consumption.—Now that estimates of the 1908-09 sugar crops are made, as published in our Weekly Journal of 22d instant, the estimates of supply and demand for the new campaign will be interesting.

The apparent consumption during the campaign year 1907-08 amounted to 14,069,709 tons, or nearly 600,000 tons less than in 1906-07. There being no reason for any material decrease in actual consumption, the apparent reduction in the figures is due to heavy inroads having recently been made in the invisible stocks, it being a fact that the stocks held in second hands on September 1st last were the smallest in years.

A fair estimate of consumption during 1908-09 would be an average of the two campaigns, 1906-07 and 1907-08, amounting to 14,348,202 tons, without allowing for the refilling of depleted stocks, and as this is more than the 14,227,000 tons estimated production for 1908-09, the indications are that stocks on September 1, 1909, will amount to only 922,104 tons, or 121,202 tons less than the stocks of September 1, 1908. The present indications are that the changes, which may be made from time to time in the total crop estimates this year, are more likely to be decreases rather than increases.

If the total production proves to be less than the present estimates, it will be necessary to check the consumption somewhat, by high prices or otherwise, in order to leave at least 1,000,000 tons in stock at the end of the campaign to cover the world's requirements until new crops are available.

We give below statistics for several years, covering stocks in principal countries, production and consumption:

	Tons.
World's Stock, September 1, 1905	1,182,748
Production, 1905-06	13,947,225
Total Supply, 1905-06	15,130,073
Consumption, 1905-06	13,726,372
World's Stock, September 1, 1906	1,403,701
Production, 1906-07	14,487,312
Total Supply, 1906-07	15,891,013
Consumption, 1906-07	14,626,695
World's Stock, September 1, 1907	1,264,318
Production, 1907-08	13,848,697
Total Supply, 1907-08	15,113,015
Consumption, 1907-08	14,069,709
World's Stock, September 1, 1908	1,043,306
Estimated Crop, 1908-09	14,227,000
Estimated Total Supply, 1908-09	15,270,306
Average Consumption Last Two Years	14,348,202
Estimated World's Stock, September 1, 1909	922,104

Czarnikow, Macdougall & Co. under date of October 23 state:

The raw sugar market gained further strength and scored an advance during the past week, but the amount of business done was not large.

The animating cause has been the continued advance in European Beets, where prices have risen 6d. to 7½d. per cwt., owing to severe frosts in Central Europe, where the coldest October weather since 1866 has been experienced this week. That the frost is expected to lessen the crop outturn is clearly evident from the upward course of prices, and it is believed that the Factory estimates, expected to be announced next week, will be a good deal lower than those recently given out by Mr. F. O. Licht.

In connection with the effect of frost, the views of an experienced Western beet grower, with which we have been favored, are of interest. He writes as follows:

"Our experience in this country, with regard to frost at this season of the year, is that it causes beets to stop growing, hence losing whatever tonnage might accrue to the beet between the date of frost and time of harvesting.

"In almost all of the localities, excepting most sections in the semi-arid regions, all of the beets are supposed to be harvested by November 1st, certainly by November 15th, as after this date a risk is run of rain or snow, with subsequent freezing of the beet in the ground; and where a beet once freezes thoroughly in the ground, it is almost impossible to get it out, and if it is once thoroughly frozen, and the sun strikes it, it then turns black."

"A fairly heavy frost has the further result in the probability of the beet starting to grow again, provided normal growing weather follows, which growth is obtained at the sacrifice of some of its sugar content and the beet runs the risk of not being ripe at time of harvesting, with the result of a decreased purity.

"As a general proposition, however, an ordinary frost at this season of the year is not regarded nearly as disastrous as should it occur during the early part of the season."

The sales reported this week are limited to old crop Cubas and a Java cargo due early next month. The Cubas were secured at the parity of 4.02c. to 4.05c. for basis 96°, and the Javas figure out 4.03c. These purchases and some unreported ones are not believed to have added more than 10,000 to 12,000 tons to supplies of refiners, several of whom must soon re appear in the market. Beyond three Java cargoes awaiting sale at Delaware Breakwater, there are no large lines of ready sugar obtainable.

The first sales of new crop Cubas have been made at 2½c. c. f., basis 96°, January-February shipment, but there are no more sellers at this price.

In Europe, the drought which began early in September has been followed, as already stated, by intense frost, and the effect of this combination of unfavorable weather conditions is seen in prices, October and November deliveries, which on 1st September were quoted at 9s. 6d. f.o.b., being now quoted at 10s. 5¼d., a price equal to 4.20c. for 96° Centrifugals landed, to 2.85c. c.f. for Cubas and to 2.51c. c.f. for non-privileged sugar. Today's f.o.b. quotations are: October, 10s. 5¼d.; November, 10s. 5¼d.; January-March, 10s. 7½d.; May, 10s. 9¾d.; August, 10s. 11¼d.

ANNUAL MEETING HAWAIIAN SUGAR PLANTERS' ASSOCIATION.

The annual meeting of the Hawaiian Sugar Planters' Association was held in Honolulu, November 9th to 12th. The meeting was held earlier in the month than has been usual during the past few years, and it was for this reason, possibly, that there was a somewhat smaller attendance of managers than customary. The reports and addresses presented and delivered were, however, of great interest and in this issue we publish such of these as have been given out for publication.

The trustees and officers of the Association elected for the coming year are: S. M. Damon, president; W. G. Irwin, vice-president; W. O. Smith, secretary and treasurer; G. H. Robertson, auditor; Royal D. Mead, assistant secretary; S. M. Damon, W. G. Irwin, W. O. Smith, G. H. Robertson, E. D. Tenney, H. P. Baldwin, F. A. Schaefer, F. M. Swanzy and J. F. Hackfeld being trustees.

Upon the convening of the meeting the retiring president, F. A. Schaefer, delivered an address of welcome to the members, in which he stated:

PRESIDENT'S ADDRESS.

To the Officers and Members of the Hawaiian Sugar Planters' Association:

Gentlemen:—A year has passed again since the members of the Hawaiian Sugar Planters' Association came together at their last annual session, and in the name of the Trustees I extend to you all a hearty welcome at the present meeting.

The business year of 1907-1908 has been the most successful one for the sugar industry of these islands which we have to record. This refers particularly to the large tonnage of sugar produced, and also in a marked degree to the good sugar prices which prevailed during that period. The total tonnage of sugar of the past year amounts to 521,123, while heretofore the yearly output has never reached 450,000 tons. The weather has been rather favorable to the growing cane, although several districts of these islands have suffered severely by prolonged droughts, particularly Kau and Kona on the island of Hawaii, and Makawao and the Kula district on Maui, and to some extent the island of Kauai as well.

This extensive crop, next to weather conditions, is largely owing to careful and judicious field work and treatment of the soil with lime and artificial fertilizer based on scientific analysis, and ultimately to the perfection arrived at in the advanced equipment of mill and boiling works to obtain the best possible results from the cane juice.

Too much praise cannot be given to the continued good work accomplished by the Experiment Station and the results obtained in its different divisions. Special annual reports of each division of the station will be submitted to you for your information and discussion, but on my part I desire to commend each individual member of the staff for his share in the successful working of the Experiment Station, without mentioning these coöperative workers by name, considering that they are long and favorably known to you. But I would be amiss in my duty if I refrained from making particular mention and speaking in the highest praise of the efforts made by Mr. Muir in the Moluccas and other islands in the Southern Pacific, to obtain specimens of parasitic enemies to the caneborer, in which effort he has already partially succeeded. As you all are aware, to your sorrow, of the destruction caused by the cane borer, you will fully realize the great boon to the sugar industry here if the cane borer should be fought after this as successfully as has the leaf-hopper in recent years. The Experiment Station, under the directorate of Mr. C. F. Eckart, and his able staff, has been doing most excellent, useful and practical work, by raising a large variety of cane seedlings and distributing them among all the plantations of this group. These seedlings are now carefully watched in their growth, and developments will show what species give most promise of large results. The coöperation of the managers of the various plantations in propagating new species of cane is greatly to be commended and fully recognized.

The labor situation, although not actually of a serious aspect at the present time, is justly a cause of constant apprehension, requiring intelligent study and watchfulness. Fortunately for the agricultural pursuits of these islands, there is a good supply of labor available to prevent any shortage to the demand, still it is very desirable that such labor should not be too largely of one nationality, but should be made up of various nationalities so far as this can reasonably be carried out. The benefit of such diversity in the labor element, is too apparent to require any argument. This fact the Trustees have fully recognized and steps are being taken having this end in view, which will be further referred to in this report.

Most important to the agricultural and industrial pursuits of this Territory have been the visits of Mr. Jas. R. Garfield, Secretary of the Interior, and of Mr. F. H. Newell, Director of the United States Reclamation Service, who, by personal observation, have made themselves acquainted with the actual situation in this Territory as regards its agricultural and industrial progress, its present needs and who have gauged its future possibilities. It will be the privilege of this Association to have Mr. Newell present at one of its daily sessions, when he will kindly deliver an address on the wonderful results obtained on the Mainland by the Reclamation Service under his directorate, and per-

haps on the possible application of this national scheme on the resources of these islands.

Mr. John D. Treanor, at the suggestion of the late Mr. Sargent, Commissioner of Immigration, was invited to visit the different islands of this group, to inform himself on the existing labor conditions here, which resulted in his engagement as agent of the Territorial Board of Immigration at New York. It is expected that he will recruit among the newly arrived Southern Europeans in New York field laborers, first on a limited scale as an experiment with the possibility of larger numbers to follow. This movement is in line with the policy of the administration in Washington and may prove to be a success in its way.

The fortunate result of the Presidential election gives assurance of a conservative administration of public affairs on the lines of the policy of the present administration, and no fear need reasonably be entertained that Congress will sanction any legislation which would affect the sugar industry of the Mainland and that of these islands disastrously.

Thus the outlook for the near future is hopeful and there seems to be little in sight to cause serious apprehension, although as planters, we are not disposed to minimize our responsibilities, nor to underrate the manifold contingencies which our industry is subject to. These are best shared and overcome by coöperative work, and the annual meeting of the members of the Hawaiian Sugar Planters' Association is one of the essential means of furthering this object by mutual discussion and exchange of opinions, and last, but not least, by social intercourse and good fellowship. All of this I trust will make this annual meeting productive of much practical good to our industry, and also be socially a success to be pleasantly remembered by its participants.

Mr. W. O. Smith, secretary of the Association, thereupon presented the following report:

SECRETARY'S REPORT—TWENTY-EIGHTH ANNUAL MEETING OF THE HAWAIIAN SUGAR PLANTERS' ASSOCIATION.

The last annual meeting of the Association was held November 11-14, 1907, in the rooms of the Association in Honolulu. The meeting was well attended and close attention was given to the reports and matters presented.

The annual banquet, which was held on the evening of November 14th, was highly enjoyed by all of the members and guests who were present.

The Trustees who were elected for the new year were: F. A. Schaefer, H. P. Baldwin, F. M. Swanzy, W. G. Irwin, W. Pfotenhauer, E. D. Tenney, E. F. Bishop, S. M. Damon and W. O. Smith.

Before the end of the year Mr. W. Pfotenhauer resigned and Mr. J. F. Hackfeld was elected in his place.

The Trustees organized and elected the following officers:

F. A. Schaefer.....President,
S. M. Damon.....Vice-President,
W. O. Smith.....Secretary and Treasurer,
G. H. Robertson.....Auditor,
R. D. Mead.....Assistant Secretary.

The Trustees have held thirty meetings during the year.

COMMITTEES.

The following is a list of the committees which were appointed for the year 1908:

Cultivation, Fertilization and Irrigation on Irrigated Plantations—H. P. Baldwin, chairman; Andrew Adams, L. Weinzheimer, G. F. Renton, H. A. Baldwin.

Cultivation and Fertilization on Unirrigated Plantations—John A. Scott, chairman; John Watt, James Gibb, W. G. Ogg, A. Lidgate.

Cutting, Loading and General Transportation—W. W. Goodale, chairman; Albert Horner, Geo. Watt, J. T. Moir, W. Stodart.

Manufacture of Sugar and Utilization of By-Products—J. N. S. Williams, chairman; John Hind, Geo. Ross, G. H. Fairchild, L. Barkhausen.

Machinery—(a) Manufacture: W. J. Dyer, chairman; C. C. Kennedy, Wm. Searby, F. Weber, E. K. Bull; (b) Agriculture: Albert Horner, chairman; J. T. Moir, E. H. W. Broadbent, F. F. Baldwin, W. W. Goodale.

Warehouses For and Storage of Raw Sugar—C. B. Wells, chairman; J. N. S. Williams, John Hind, J. T. Moir, B. D. Baldwin.

Forestry—L. A. Thurston, chairman; Geo. H. Fairchild, W. W. Goodale, H. A. Baldwin, A. Ahrens.

Experiment Station—J. P. Cooke, chairman; W. M. Giffard, Geo. H. Robertson, Geo. F. Davies, W. Pfotenhauer, J. W. Waldron, R. D. Mead.

Labor—E. D. Tenney, chairman; W. Pfotenhauer, E. E. Paxton, R. D. Mead.

Attention is again called to the suggestion made, in the secretary's last report, that further consideration be given to the subject of the appointment of committees of managers and of their reports.

It may be that instead of the president appointing the usual stated number of members on each committee it would be better that he appoint one member on each committee who should be chairman, and each chairman so appointed select the other members of his committee. This, however, is a matter for consideration and action at the annual meeting.

CROP REPORTS.

The reports of the sugar crops for the year ending September 30, 1908, are herewith submitted. The crop has been the largest produced during any year in the past, making a total tonnage for the year of 521,123 tons.

The yield by islands has been as follows:

Hawaii	180,159	Tons
Oahu	137,013	"
Maui	122,629	"
Kauai	81,322	"
Total	521,123	"

The largest crop heretofore produced in one year was that of 1907, amounting to 440,017 tons.

The seasons were favorable, both for growing the crops during 1907 and for harvesting in 1908.

The facilities for transporting and marketing have been better the past year than ever before.

COMMITTEE REPORTS.

The chairmen of the various committees will report upon the subjects assigned to them.

The Committee on Labor has held many meetings during the year and had various plans under consideration. Upon the recommendation of this committee the Trustees decided that in order to carry out more systematic and comprehensive plans in regard to maintaining an adequate supply of laborers it was desirable that a labor bureau be organized to be in the immediate charge of capable and efficient officers. Steps have already been taken to carry out this object and it is hoped that much benefit will result therefrom.

WASHINGTON.

Mr. F. M. Hatch, the representative of the Association at Washington, has rendered valuable and efficient service, and the Association is fortunate in being able to retain him as their representative at the seat of government.

TARIFF REVISION.

Congress is about to consider the subject of tariff revision and hearings are about to be had before a committee in anticipation of the new session of Congress. It is of the utmost importance to the sugar interests of these islands that there should be no

diminution of the tariff on sugar imported into the United States from foreign countries. This subject has been given earnest consideration by the Trustees and our representative at Washington. Without tariff protection sugar could not be produced at a profit in these islands owing to the cost of production, distance from the market and cost of transportation.

THE DEATH OF MR. THOMAS RAIN WALKER.

Since the last annual meeting news was received of the death of Mr. Thomas Rain Walker, who, for many years, was a member of this Association and identified with the interests of these islands.

After receipt of the news of his death the Trustees adopted the following resolution, on September 23rd, 1908:

"*Whereas* the said news has this day been received of the death of Mr. Thomas Rain Walker, a former member and Trustee of this Association;

"*Be it Resolved,* That we, the Trustees of the Hawaiian Sugar Planters' Association, in meeting assembled, hereby record our deep sorrow at the death of our esteemed colleague and friend;

"*That* in the death of Mr. Walker this Association and the community of these islands have lost a friend who by his attainments, his marked integrity and uniform courtesy, commanded the respect and confidence of all;

"That we convey to the widow and family of the deceased our profound sympathy in their bereavement."

STATEMENT OF HAWAIIAN SUGAR CROP, 1907-1908, FROM OCT. 1, 1907, TO SEPT. 30, 1908.

ISLANDS.

	*Tons	Total tons
Hawaii—		
Hawaii Mill Co., Ltd.	2,818	
Waiakea Mill Co.	9,761	
Hilo Sugar Co.	12,853	
Onomea Sugar Co.	17,006	
Pepeekeo Sugar Co.	7,590	
Honomu Sugar Co.	7,511	
Hakalau Plantation Co.	12,834	
Laupahoehoe Sugar Co.	7,944	
Ookala Sugar Plantation Co.	5,195	
Kukaiau Plantation Co.	2,141	
Kukaiau Mill Co.	1,427	
Hamakua Mill Co.	12,355	
Paauhau Sugar Plantation Co.	10,448	

* 2,000 pounds to the ton.

Honokaa Sugar Co.	7,657	
Pacific Sugar Mill.	3,459	
Niulii Mill and Plantation.	2,452	
Halawa Plantation	1,953	
Kohala Sugar Co.	4,914	
Union Mill Co.	3,259	
Hawi Mill and Plantation.	7,125	
Hutchinson Sugar Plantation Co.	9,628	
Hawaiian Agricultural Co.	10,274	
Puakea Plantation	661	
Olaa Sugar Co., Ltd.	15,795	
Puna Sugar Co., Ltd.	1,691	
Puako Plantation	403	
Kona Development Co.	1,000	
		180,159
Maui—		
Kipahulu Sugar Co.	1,843	
Kaeleku Plantation Co., Ltd.	3,026	
Maui Agricultural Co.	22,627	
Hawaiian Commercial & Sugar Co.	56,150	
Wailuku Sugar Co.	10,072	
Olowalu Co.	1,765	
Pioneer Mill Co., Ltd.	27,146	
		122,629
Oahu—		
Waimanalo Sugar Co.	4,242	
Laie Plantation	971	
Kahuku Plantation Co.	6,519	
Waialua Agricultural Co., Ltd.	30,376	
Waianae Co.	5,686	
Ewa Plantation Co.	33,919	
Apokaa Sugar Co., Ltd.	984	
Oahu Sugar Co.	35,320	
Honolulu Plantation Co.	18,996	
		137,013
Kauai—		
Kilauea Sugar Plantation Co.	3,194	
Makee Sugar Co.	7,408	
Lihue Plantation Co.	14,445	
Grove Farm Plantation.	2,508	
Koloa Sugar Co.	7,361	
McBryde Sugar Co., Ltd.	11,294	
Hawaiian Sugar Co.	21,633	
Gay & Robinson.	2,675	
Waimea Sugar Mill Co.	1,790	
Kekaha Sugar Co.	8,283	
Estate V. Knudsen.	731	
		81,322
Total . .		521,123

AGENTS.

	Tons	Total tons
Alexander & Baldwin, Ltd.		
Hawaiian Sugar Co.	21,633	
Maui Agricultural Co.	22,627	
Hawaiian Commercial & Sugar Co.	56,150	
Kahuku Plantation Co.	6,519	
Laie Plantation	971	
		107,900
H. Hackfeld & Co., Ltd.		
Lihue Plantation Co.	14,445	
Grove Farm Plantation	2,508	
Koloa Sugar Co.	7,361	
Kekaha Sugar Co.	8,283	
Pioneer Mill Co., Ltd.	27,146	
Kipahulu Sugar Co.	1,843	
Kukaiau Plantation Co.	2,141	
Oahu Sugar Co.	35,320	
Hawaii Mill Co., Ltd.	2,818	
		101,865
W. G. Irwin & Co., Ltd.		
Honolulu Plantation Co.	18,996	
Paauhau Sugar Plantation Co.	10,448	
Hutchinson Sugar Plantation Co.	9,628	
Hakalau Plantation Co.	12,834	
Hilo Sugar Co.	12,853	
Kilauea Sugar Plantation Co.	3,194	
Waimanalo Sugar Co.	4,242	
Olowalu Co.	1,765	
		73,960
Castle & Cooke, Ltd.		
Waialua Agricultural Co., Ltd.	30,376	
Ewa Plantation Co.	33,919	
Apokaa Sugar Co., Ltd.	984	
Kohala Sugar Co.	4,914	
Waimea Sugar Mill Co.	1,790	
		71,983
C. Brewer & Co., Ltd.		
Hawaiian Agricultural Co.	10,274	
Wailuku Sugar Co.	10,072	
Honomu Sugar Co.	7,511	
Onomea Sugar Co.	17,006	
Ookala Sugar Plantation Co.	5,195	
Pepeekeo Sugar Co.	7,590	
		57,648

Theo. H. Davies & Co., Ltd.		
Waiakea Mill Co.	9,761	
Laupahoehoe Sugar Co.	7,944	
Kukaiau Mill Co.	1,427	
Hamakua Mill Co.	12,355	
Niulii Mill and Plantation	2,452	
Union Mill Co.	3,259	
McBryde Sugar Co., Ltd.	11,294	
Kaeleku Plantation Co., Ltd.	3,026	
		51,518
Bishop & Co.		
Olaa Sugar Co., Ltd.	15,795	
Puna Sugar Co., Ltd.	1,691	
		17,486
F. A. Schaefer & Co., Ltd.		
Honokaa Sugar Co.	7,657	
Pacific Sugar Mill	3,459	
		11,116
Hind, Rolph & Co.		
Hawi Mill and Plantation	7,125	
Puako Plantation	403	
		7,528
Makee Sugar Co.		
Makee Sugar Co.		7,408
J. M. Dowsett.		
Waianae Co.		5,686
Henry Waterhouse Trust Co., Ltd.		
Gay & Robinson	2,675	
Halawa Plantation	1,958	
Puakea Plantation	661	
		5,294
Hawaiian Development Co., Ltd.		
Kona Development Co.		1,000
H. M. von Holt.		
Estate V. Knudsen		731
Total		521,123

Other reports presented dealt with the following subjects: Experiment Station, Machinery, Manufacture of Sugar and Utilization of By-Products, Warehouses for and Storage of Raw Sugar, and Forestry, which we publish herein as presented without further comment:

REPORT OF COMMITTE IN CHARGE OF EXPERIMENT STATION.

To the President, Board of Trustees and Members of the Hawaiian Sugar Planters' Association:

The Committee in charge of the Experiment Station hereby submits its report for the twelve months ending September 30th, 1908:

DIVISION OF AGRICULTURE AND CHEMISTRY.

Laboratory Work.—Whilst the total number of analyses made in the laboratories of the Division of Agriculture and Chemistry is lower than that made in the year ending September 30th, 1907, yet there is a substantial increase in those made at the request of plantations and of plantation agencies. The decrease in the total number of analyses and in the number made for the Experiment Station is due to the large number of analyses of seedling canes made in 1907.

There has been a substantial increase in the number of fertilizer samples examined, the number exceeding by 23 per cent. those examined for the year ending September 30, 1907. The saving to the members of the Association during the past year amounts to $5406, a decrease of over $3000 compared with the corresponding amount for 1907.

Fertilizer Sampling.—During the past year a scheme for the sampling of fertilizers has been initiated which should go far to prevent any disputes regarding the authenticity or correctness of the samples. In Honolulu the samples are regularly taken after they have left the factory by an employe of the Experiment Station, his work being overlooked by the shipping clerk of the fertilizer company, who also signs the label on the bottle containing the sample of fertilizer. A similar scheme is in operation in San Francisco, your interests there being represented by Messrs. Curtis & Tompkins, an old established firm of analytical chemists.

Weekly Mill Reports.—The weekly mill reports issued during the past year contain the results of one more mill than in the previous year, and represent altogether about 90 per cent. of the output of the whole islands. The annual synopsis which was initiated last year and contained the results of work in twenty-five factories will this year include the results of thirty-two, and should afford a valuable compilation of actual results.

Mill Control Work by Station Chemists.—This scheme, which was initiated in 1907, has been continued during the present year, when Dr. R. S. Norris visited and made tests of the extraction at eight plantations on Hawaii.

Seedling Canes.—The efforts of the Experiment Station have this year been directed rather towards obtaining a supply of planting material from the seedling canes already obtained and furnishing material to the members of the Association than towards the raising of further quantities of new varieties. Keeping in view the very different climatic and soil conditions to be found in the islands, the Director of the Division decided that it would be better to make only a preliminary selection at the Experiment Station, and to make the final selection under the actual conditions prevailing on the plantations; in this way it may be found that a cane of high promise at the Experiment Station may maintain its promise on one plantation, but yet may be very disappointing when grown on another. While we confidently hope that sooner or later a number of new varieties will be obtained which will be grown in the districts best suited to them, yet we must point out the danger of condemning the new varieties if the first consignments of seedlings should not disclose any canes adapted to the conditions of the plantation where they are sent.

Artificial Hybridization of Canes.—The work which was done in this direction was very successful, and in all eighty-three cross bred varieties, the parentage of which is known on both sides, were obtained and were planted out in the Experiment Station field. A list of these seedlings is given in the report of the Director of the Division.

Sub-Station Work.—The canes on six sub-stations were harvested during the past year, and the results obtained were embodied in Circular No. 6; a feature of these results was the uniformly high place taken by the imported seedling, D. 1135; should this cane maintain its promise when grown on an extended scale it is an example of the danger of condemning a cane on a limited number of results, since, we understand, this cane has never been prominent as a sugar producer in Demerara, where it was originally raised.

Bulletins and Circulars.—During the year the following bulletins and circulars have been published:

Circular No. 7.—Sub-station plans for 1908.

Bulletin No. 21.—Evaporator Scale. This contains an account of analyses of scale from a number of factories and suggestions whereby the deposit of scale can be lessened.

Bulletin No. 22.—A theory of the extraction of juice by milling; contains an account of the results which may be expected as the result of different methods of applying the maceration water.

Bulletin No. 23.—Use of formaldehyde solution in sugar mills, is intended to call attention to the uses of this material as a technical antiseptic.

Bulletin No. 24.—Deterioration of sugars on storage. This bulletin reviews the causes of deterioration, and calls especial attention to the combined effect of moisture and bacterial life.

Bulletin No. 25.—Results from stripping tests; shows the loss due to stripping when carried out at the Experiment Station.

Circular No. 8.—Results from stripping tests conducted by the Hakalau Plantation Co.; also calls attention to the loss from stripping under conditions of heavy rainfall.

Circular No. 9.—Field tests with varieties of cane at the H. S. P. A. sub-stations,—contains an account of the results obtained on harvesting the sub-stations at Puunene, Waialua, Makaweli, Olaa, Pacific Sugar Mill and Kohala.

Circular No. 10.—Treatment of low grade sugar; records the replies received to a circular letter from the Experiment Station Committee dealing with this matter.

Bulletin No. 26.—Varieties of cane, with special reference to nomenclature; is an attempt to reduce the confusion into which the nomenclature of canes has fallen.

From the above list it will be seen that the amount of work accomplished by the Division is greater than in any previous year. The stress of work and his continued presence at the Experiment Station so told on Mr. Eckart's health that he found it advisable to apply for leave of absence, and a year's leave was given him as from July 1, 1908. During his absence the Division of Agriculture and Chemistry will be directed by Mr. Noel Deerr.

A full account of the work of the Division is contained in the report of the Acting Director.

DIVISION OF ENTOMOLOGY.

The economic work of this Division for the past period has continued on lines similar to those laid out by the present Director since the organization of the division in 1903,—that is, controlling, by means of their natural enemies, insects which are injurious to sugar cane.

Previous reports have dealt so thoroughly with the successful entomological campaign which has been carried on against the attacks of the cane leaf-hopper, and the bulletins issued by the Division during the past two years or more have given such technical and elaborate details as regards its natural insect-enemies, which have been introduced and established by our entomologists in the cane fields, that it seems merely necessary at this time for your committee to give but passing notice to this particular subject. All are familiar with the conditions which universally existed in the cane fields of these islands two or more years ago, as well as with the losses which were sustained during the period that the leaf-hopper pest was in absolute control. You also appreciate the difference in these conditions since the introduced natural enemies to this pest have been thoroughly and systematically established on all our plantations. Realizing these facts, as you undoubtedly do, it is safe to say that the few thousands of dollars contributed towards the search and successful establishment of natural enemies to the hopper and the corresponding control up to this time of the latter have been well invested, and that the

results from a purely financial standpoint have been more than gratifying. We must not, however, rest solely upon what has already been accomplished, but, as a precautionary measure, special attention must be continued by managers in the future as in the past as regards the systematic distribution of cages of leaf-hopper parasites in fields of young cane, as periodical attacks of the hopper are otherwise liable to occur. There is little danger, however, of further trouble from the hopper if proper care is exercised, as the conditions which produce such periodical attacks are now pretty well understood by the majority of managers.

When your committee submitted its last annual report the work of the Division in connection with the sugar cane borer was practically in its initial stage. At that time Mr. Muir, who had been selected and sent to the Malay Archipelago to find the borer in that region, in addition to such predaceous and parasitic enemies as attacked it there, had had but little opportunity for effective research work. The report further stated that owing to the long distances and changes of climate between the Malays and Hawaii, a half-way station would of necessity have to be established in order to successfully introduce such predators or parasites as Mr. Muir might discover and deem desirable to send. This half-way station was established at Hongkong last April in charge of Mr. Terry of the Division. The Director of the Division in his present annual report is now enabled to record the fact that predaceous beetles feeding on the larvae of cane-borers have not only been discovered by Mr. Muir, but have been successfully shipped by that entomologist, through the half-way station, and have been received here in Honolulu in good condition. Certain of these predators, the Director further notes, have been distributed in cane fields in certain districts where the cane-borer was abundant and where the predators in question may eventually become established. The Director also records the discovery, by Mr. Muir, of a parasitic fly on the larvae of borer in the Moluccas. This latter insect, however, has not been successfully bred for shipment as yet, for reasons which are mentioned in the Director's report. As a detailed account of the work done in connection with cane-borer and its natural enemies is given in the Director's annual report, it appears quite unnecessary for your committee to go into further details as to this particular matter. It may be added, however, that it has been deemed very desirable to have Mr. Muir return to the Moluccas and there continue his research work and, if possible, secure further details as to the life history of the parasite in question, as well as perhaps discover others, so that the undertaking may, if possible, ultimately meet with success. In that connection, therefore, your committee has to report that instructions to the above effect have been cabled to Mr. Muir at Hongkong. Further instructions have also been sent to abandon temporarily the half-way station at Hongkong, at least until such time as the Director may receive assurances that that establishment is again necessary, it being practically

useless to maintain it as long as Mr. Muir is away from all civilization and steamship connection. In the meantime the Division will keep under observation such cane fields in the several districts of these islands in which the predaceous beetles above referred to have been liberated. It should be particularly noted that the Director has called attention to the fact that even should these predaceous insects become established, they are more liable to suffer from the periodical burning of the trash in the cane fields than would be suffered by any parasite. In connection with the work done by Mr. Muir in the Malay Archipelago, your committee might state, as a matter of information, that the lack of a reliable mail service, together with interrupted and infrequent shipping facilities, throughout the Dutch Indies, has caused the Division, and Mr. Muir in particular, much annoyance and anxiety, and has to some extent hampered the work. Letters which have been mailed to the Director via Hongkong (the nearest and safest route) have frequently come via India, London and New York, taking twice the time to get here. In some instances packages, as well as letters, even when registered, have gone astray, apparently through the negligence of the postal authorities in the Dutch Indies, through whom all Mr. Muir's mail and other matter has to be handled prior to its arrival at Hongkong or other central shipping ports. This quite important matter has already been made the subject of correspondence with the authorities in the Postal Union, and further complaints will shortly be made by your committee with a view to having all such mail matter, if possible, reach its destination quickly and safely. The assistance and courtesies rendered to the Division generally, and to Mr. Muir in particular, by the respective U. S. Consuls at Batavia and Hongkong, in connection with mail matter, has been much appreciated. The same may be said of the General Agent of the Pacific Mail Steamship Company at Hongkong, as regards courtesies rendered in the matter of insect shipments to Honolulu. The Agricultural Institute at Hongkong, through its officials, has also rendered every possible facility to both Messrs. Terry and Muir during the period these gentlemen have had the use of its laboratory, and has also extended other courtesies which have been much appreciated by your committee.

Last April arrangements were made through the Director to have Mr. Koebele visit parts of Europe in search of natural enemies of the horn-fly. Mr. Koebele began his investigations in this connection about June last, the expenses of which are to some extent being contributed to by the Territorial Board of Agriculture and the Live Stock Breeders' Association. This special work has been mentioned by the Director in his report, to which reference can be made for further details.

Through the death of Mr. Alexander Craw, which occurred in June last, the Association and Experiment Station has sustained a serious loss. The late Mr. Craw, as you all know, was attached

to the staff of the Entomological Division as a consulting entomologist, his special duties, however, being as Quarantine Plant Inspector under the auspices of the Territorial Board of Agriculture. During his four years' faithful service in that important official capacity, the work superintended by him has been of paramount importance, not only to the sugar planters, but also to the agricultural interests at large. Among his numerous duties as Plant Inspector he particularly safe-guarded the interests of the planters as to unnecessary importations of sugar cane cuttings coming from other sugar-growing countries. Many such importations were necessarily destroyed by him which contained injurious insects and other pests, which if established here would, in time, have undoubtedly caused serious loss to sugar plantations. Aside from his official duties, wherein he displayed much efficiency as well as extraordinary tact and judgment, the late Mr. Craw was much respected by all who came in contact with him, and his loss as an entomologist and as the official Quarantine Plant Inspector is in very many respects irreparable.

DIVISION OF PATHOLOGY AND PHYSIOLOGY.

Organization and Staff.—As Mr. Lewton-Brain has pointed out in his report, the work of this division has increased to such an extent that it was absolutely necessary to engage the services of an additional assistant. Letters were written to the Mainland, England, India and South Africa in an endeavor to secure the right man, which resulted in the appointment of Mr. Larsen. Mr. Larsen has not had much practical field experience hitherto, but we have reason to expect that with the facilities placed in his way he will speedily familiarize himself with our local field conditions.

Although Dr. Cobb severed his actual connection with the Station in 1907, this Division has still been receiving the benefit of his services in connection with Bulletin No. 6. It was the understanding of the Trustees that Dr. Cobb should carry this work to completion after going to Washington, and this arrangement has been carried out. The value of this thorough and able treatise on cane diseases is largely enhanced by its beautiful illustrations, the whole forming a publication of which the Station may well feel proud.

Publications.—The publications of the Division have been less numerous than usual on account of Dr. Cobb's Bulletin No. 6. One other bulletin, on Red Rot, and a circular on Thielaviopsis and the disinfection of cane cuttings have been issued and two other bulletins are well under way. In connection with our publications from the Station, it is gratifying to see the appreciation in which they are held by scientists in other parts of the world.

Experimental Work.—In addition to the general work in connection with the investigation of plant and root diseases two in-

teresting branches of work have been taken up, one on the forest conditions on Maui the other on pineapple diseases.

With regard to the forest disease which has been manifesting itself on Maui, Mr. Lewton-Brain's report is in the nature of a preliminary investigation. It is planned that Dr. Lyon should go up shortly to make a complete study of the disease and to stay as long as may be necessary to attain that end.

There are several of our sugar corporations which are more or less closely identified with the pineapple industry here, and it has been considered desirable to take up the question of diseases to which the plants are liable. This work is being conducted in conjunction with the Director and Chemist of the Federal Experiment Station.

It is satisfactory to read that no serious damage seems to have been caused during the year by Ithyphallus, and Mr. Lewton-Brain's remarks in connection with root diseases merit careful attention. The work on the Bacterial Flora of Hawaiian Sugars has yielded some exceedingly interesting results, which will, it is hoped, be ready for publication before long.

Too much attention on the part of managers can not be given to Mr. Lewton-Brain's remarks concerning the sending in of specimens to the Station for investigation. The study of the sugar cane from its pathological and physiological aspect is still in its comparative infancy, and it would greatly facilitate the work of the Division besides increasing its usefulness, if any unusual conditions in the fields were carefully noted and specimens sent to the Station as soon as possible. We trust that in the rush of work on a plantation this important matter will not be lost sight of.

Respectfully submitted,

J. P. COOKE, *Chairman,*

G. H. ROBERTSON,
R. D. MEAD,

Sub-committee Division of Agriculture and Chemistry;

W. M. GIFFARD,
W. PFOTENHAUER,

Sub-committee Division of Entomology;

G. F. DAVIES,
J. W. WALDRON,

Sub-committee Division of Pathology and Physiology;

Experiment Station Committee.

Honolulu, October 1, 1908.

REPORT ON MACHINERY—MANUFACTURE.

Honolulu, November 5, 1908.

To the Trustees and Members of the Hawaiian Sugar Planters' Association:

Gentlemen:—I beg to hand you herewith the report of the Committee on Machinery-Manufacture, consisting of the following:

Report on Mill Machinery in General, and a communication from the mill Superintendent at Oahu Sugar Company on the work done in their factory during the past season.

Respectfully submitted,

W. J. DYER,
Chairman Committee on Machinery-Manufacture.

MILL MACHINERY IN GENERAL.

The sugar produced in the Hawaiian Islands during the season just closed represents the largest output in the history of the industry, and this increased production has naturally called for a corresponding increase in the capacity as well as in the efficiency of the factories and machinery for handling same.

The following tabulated statement sets forth the size of the mills in a few of our factories handling the largest crops, together with the amount of raw sugar produced in each, during the 1907-1908 season:

Plantation.	Equipment.	Tons of Sugar Produced.
Hawaiian C. & S. Co.	2—34″x78″ 12 RM.	56,150
Oahu Sugar Co.	1—34″x78″ 12 RM.	35,320
Ewa Plantation Co.	2—34″x78″ 9 RM.	33,919
Waialua Agricultural Co.	1—34″x78″ 12 RM.	30,376
Pioneer Mill Co.	1—34″x72″ 9 RM.	27,146
Maui Agricultural Co.	2—34″x66″ 9 RM.	22,627
Hawaiian Sugar Co.	1—34″x78″ 12 RM.	21,633
Honolulu Plantation Co.	1—34″x72″ 9 RM.	18,996 (refined)
Onomea Sugar Co.	1—32″x66″ 9 RM.	17,006
Olaa Sugar Co.	1—34″x78″ 9 RM.	15,795

The tons of cane ground per hour, per foot of roll, together with the extraction and dilution, at the above mills, during the months of April, May and June, 1908, averaged as follows:

MILL	Equipment	Tons of Cane Ground per Hour		Extraction % Sucrose in Cane	Dilution % Normal Juice
		Total	Per Lineal Foot Roll		
Oahu Sugar Co.....	1-34x78-12 RM	64.11	9.86	94.44	31.85
Waialua Agr. Co.....	1-34x78-12 RM	52.48	8.07	94.33	34.86
H. C. & S. Co.....	2-34x78-12 RM	103.55	7.97	94.76	13.48
Pioneer Mill Co.....	1-34x72- 9 RM	45.04	7.51	94.25	44.66
Olaa Sugar Co.....	1-34x78- 9 RM	38.11	5.86	93.88	23.54
Onomea Sugar Co.....	1-32x66- 9 RM	31.47	5.72	94.35	30.97
Hawaiian Sugar Co.....	1-34x78-12 RM	36.30	5.59	95.32	16.07
Ewa Plantation Co.....	2-34x78- 9 RM	64.93	4.99	94.61	41.98
Maui Agr. Co.....	2-34x66- 9 RM	54.32	4.94	94.08	19.15

It will be noted that the highest average extraction was at the Hawaiian Sugar Company's Mill, showing 95.3%, with a dilution of 16%. The quantity of cane ground per hour was, however, the lowest of the twelve-roller mills—5.59 tons of cane per lineal foot of roll—and this accounts for the high extraction.

It will also be noted that the Hawaiian Commercial & Sugar Company's Mill, with 7.97 tons of cane per lineal foot of roll per hour passing through the rolls, obtained an average extraction of 94.76%, with 13.48% dilution, this dilution being exceptionally low, considering the quantity of cane ground per hour.

Perhaps the discussion of these points may be infringing on the report of the Committee on Manufacture, but at the same time it is particularly interesting from an engineering standpoint, as illustrating the capacity of milling plants, and the manner in which extraction is affected by the amount of cane passing through the mill per hour and the amount of dilution used.

Another feature, of course, to be considered in the discussion of the milling question, is the thickness of the feed, or, in other words, the speed at which the rolls travel, which brings up the points of a high roll speed with a thin feed, or a low speed with a heavy feed.

There is no data on this subject in the weekly reports of the Hawaiian Sugar Planters' Experiment Station.

It can be readily understood from the above figures that the adjustment and proper working conditions in these mills, to obtain such results, call for continuous attention on the part of the personnel in charge.

RETURNER BARS.

Formerly the great question with three-roller mills was the returner bar. This was such a serious matter fifteen to twenty years ago that the three-roller mill was practically abandoned in favor of multiple sets of two-roller mills. However, when three-

roller mills, of heavier construction, again came into favor, the returners naturally became the issue again, but returner bars of adequate strength eradicated this difficulty.

There are other features, however, that require attention on the part of our engineers, the principal of these being as follows:

INTERMEDIATE CARRIERS.

The intermediate carriers between the mills are a source of continual annoyance and probably the cause of more delay than any other part of the sugar mill machinery.

The Hawaiian Commercial & Sugar Company has been experimenting, for the past year, with a canvas belt; this has proven so exceedingly satisfactory that both of their twelve-roller mills will be equipped with these belts for the next grinding season.

In many of the Cuban mills the intermediate conveyor consists of a chain arrangement, with rakes attached, which scrape the feed along the bottom of a conveyor chute between the mills.

The writer has been informed that in some of the Peruvian mills this conveyor is replaced by a closed iron chute, the bagasse from the first mill forcing the feed through this chute to the second mills, etc.

At the McBryde Sugar Company's Mill the intermediate carrier consists of a long pitch chain (about six inches pitch), to which is attached a galvanized, corrugated slat, which, I understand, gives excellent results.

There is, however, opportunity for improvement in the apparatus between the mills over the present types of intermediate conveyor construction.

The main object aimed at in the apron conveyor is to deliver the feed to the mill as it comes from the preceding one, without breaking or disturbing its bulk, or, in other words, the "blanket." Whether or not there is anything in the "blanket" argument, is a question. With the introduction of the first maceration mills, the delivery of the bagasse from the first to the second mills in the shape of the so-called "blanket" was the chief object aimed at.

This arrangement of conveyor was, however, later discarded, the bagasse being delivered by means of an inclined elevator into a chute and feeder, which was apparently a great improvement over the previous method of feeding the mills, so that the type of conveyor used is more a matter of local custom than of any special merit.

HYDRAULICS.

All of our mills are fitted with hydraulics, and this is another feature which causes more or less delay, from time to time, due to the leather crimps blowing out.

The engineer at one of the Oahu mills has suggested that if some construction of hydraulics could be devised that would dou-

ble the area of the present rams, there would, in his opinion, be no occasion for shut-downs on the score of hydraulics.

A system of mill hydraulics is to be installed with the Kona Development Company's new mill, which is now under construction, in which the jack at each side of the mill has its own accumulator, so that each end of the roll can be loaded to suit working conditions. In this instance the mill will have pinions at one end only, so that, according to the usual understanding, it will be necessary to increase the load on the jack at the pinion end to compensate for the upright thrust due to the gearing, the idea being to have the rollers equally loaded at both ends, as nearly as possible.

In some cases in our Hawaiian mills, with the single accumulator, this thrust from the gearing is compensated for by making the jack at one end slightly larger in area, as is done at Wainaku with all of their mills.

ROLLER ADJUSTMENT.

Another feature that is subject to criticism is the method adopted for adjusting the rolls, that is, the adjusting screws on the mill caps.

The pressure on the rolls is so great that there is a tendency on the part of the adjusting screws to strain or strip the threads, rendering further adjustment impossible. In fact, there have been occasions when the adjusting screw thread has been sheared off the bolt.

The method of adjusting the rolls as used in our old mills was quite effective, doing away, as well, with the features that subject the present means of adjustment to criticism. In the old mill construction, shims were placed between the caps and the mill cheeks, and the caps pulled up, iron to iron, with the side bolts. In fact, in marine practice, which represents the highest type of engineering construction, gibs, keys, set-screws, etc., have all been abandoned, and the adjustment of all working bearings, pins, etc., is done by means of shimming the caps, or adjusting parts, as the case may be, these being bolted up solid so that there is no opportunity for slack motion, or of the parts jarring loose from the running of the machinery.

This method of adjustment could be readily adopted to our present mills by dispensing with the set screws and providing a suitable block to make up the distance between the brass and the cap.

FIFTEEN-ROLLER MILL.

A most interesting innovation will be the installation, at the Ewa Plantation Company's Mill, for use during the coming grinding season, of suitable conveying apparatus so as to operate the present two, nine-roller mills, as one, fifteen-roller mill. The

crushing plant at Ewa Mill will then consist of a crusher and five three-roller mills, or a total of seventeen rolls.

Undoubtedly the same improvement will be shown, with the fifteen-roller mill over the twelve, as was shown with the twelve-roller mill over the nine, that is, there should be a marked improvement in the extraction, with a reduction in the amount of maceration required, and, in all likelihood, with this multiple mill arrangement, less pressure will be required on the hydraulics, and consequently they will require less attention—in fact, a reduction of pressure on the hydraulics should mean an easing up, not alone in power required, but in the load on the bearings, returner bar, etc., and there is no reason, if the anticipated results are obtained, why the Ewa Plantation Company's milling plant should not be arranged as an eighteen-roll crushing plant.

BOILERS.

"Figure one" shows the manner in which a set of boilers was installed at the Union Mill, Kohala, the object aimed at being to dispense with the sheet-iron flues, uptake, etc., so that the boiler setting proper would be entirely of brick or masonry, eliminating the sheet-iron construction.

Sheet-iron flues give off a great amount of heat, making the boiler room uncomfortable, unless these flues are brick lined, as is sometimes done with flues of small dimensions.

It will be noted that the flue which delivers the gases into the stack is back of the furnace.

The smoke stack in this instance is of the self-supporting type, dispensing with the wire guys, and presenting a more substantial and permanent appearance.

CENTRAL CONDENSATION.

The installation of central vacuum pumps in our mills is gaining in favor. "Figure two" shows the vacuum and water supply pumps now being installed at the Waiakea Mill Company's factory, which will dispense with five pumps of the ordinary type, with their numerous rubber valves and flexibly packed pistons and rods, which demand the continuous attention of the engineer, at all hours.

The installation as shown consists of a two-stage centrifugal pump, this type being adopted to reduce the speed, and a dry vacuum pump in which the piston packing is with snap rings, and the valve an ordinary slide valve, no other valves, or soft packing of any nature, being required, attention, consequently, being reduced to a minimum, in addition to which a higher vacuum is obtained than is possible with the ordinary wet or dry vacuum pumps, resulting in an economy of heat throughout the factory.

"Figure three" represents the central condensation system as

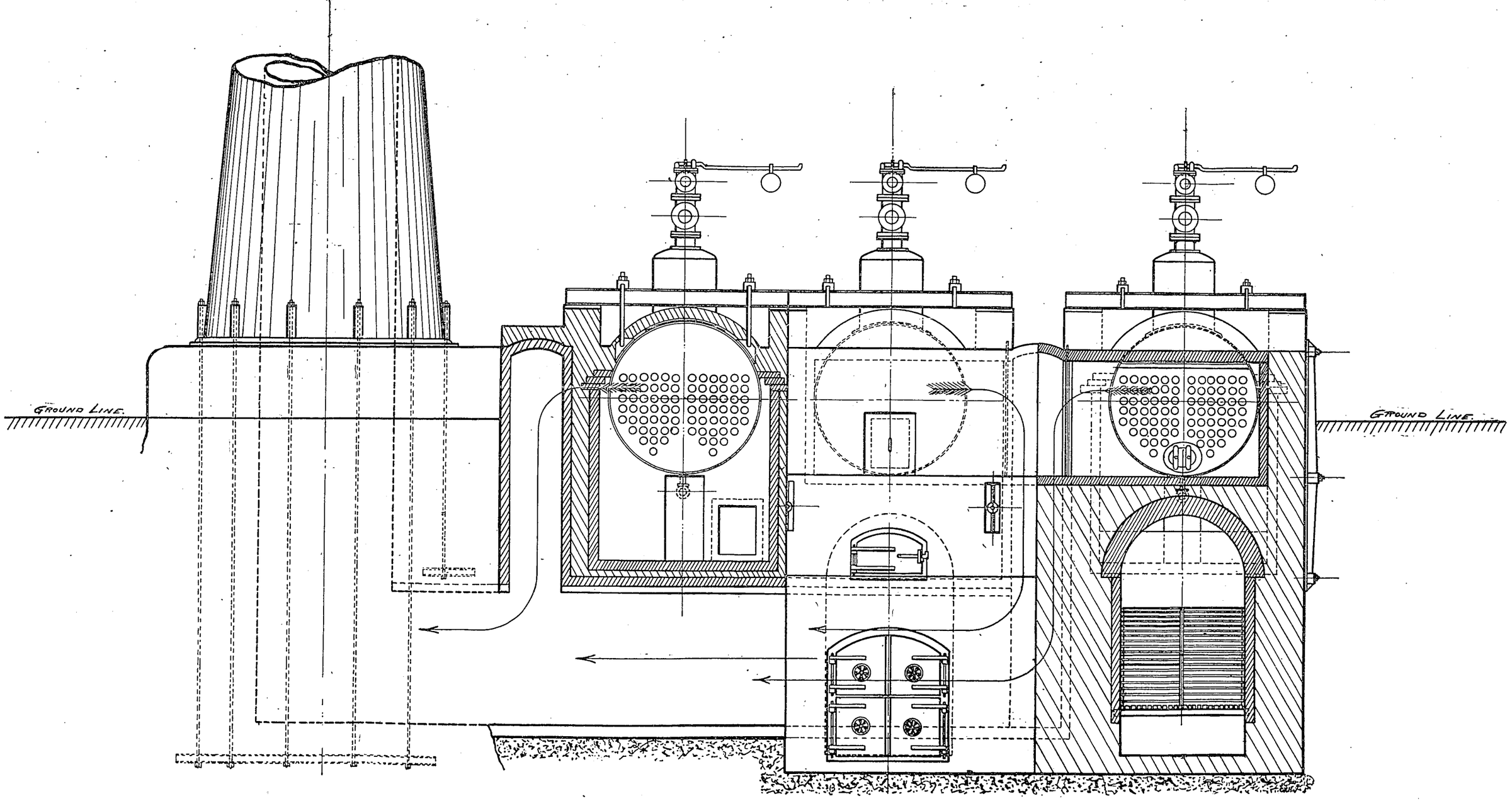

Figure 1.

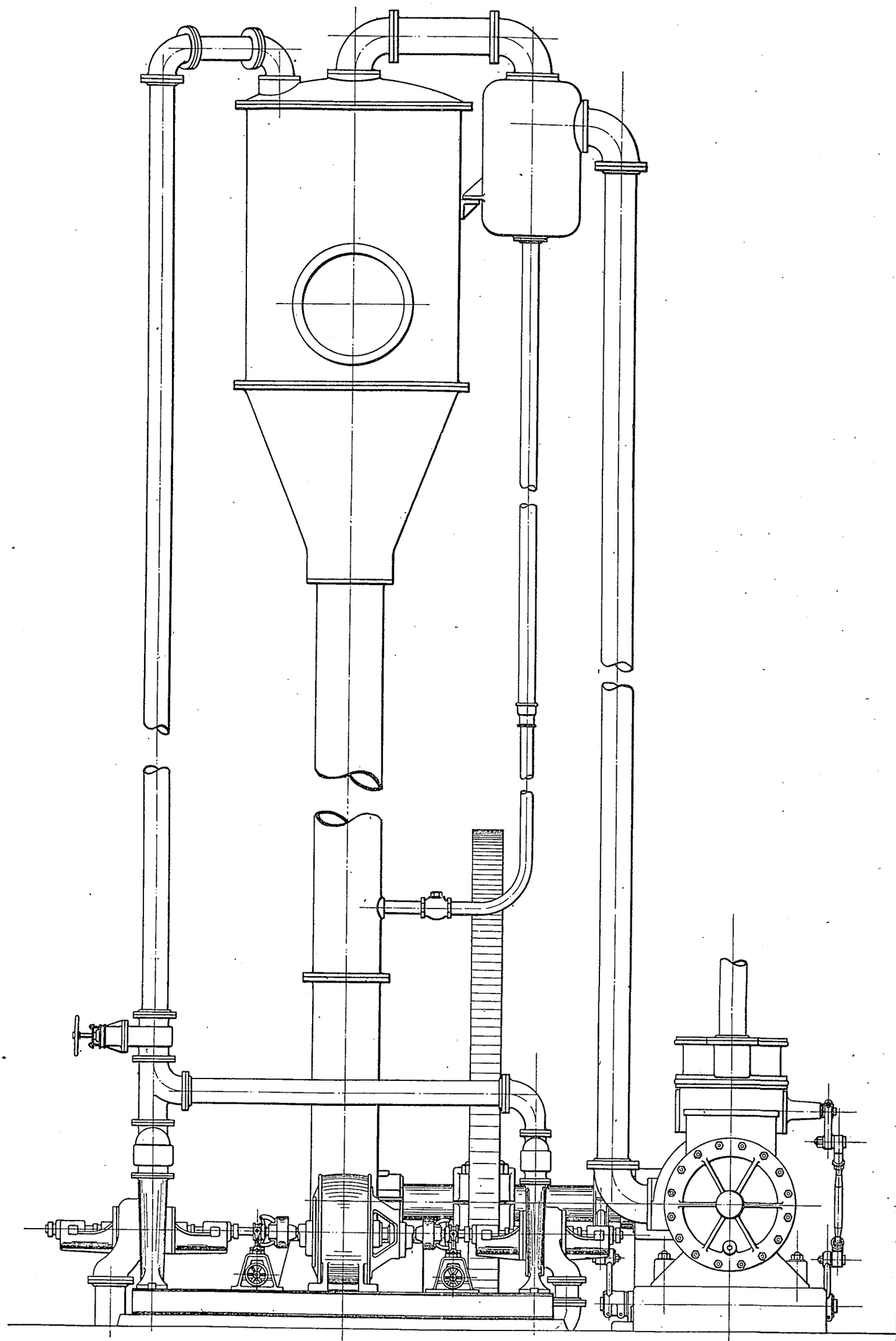

Figure 2.

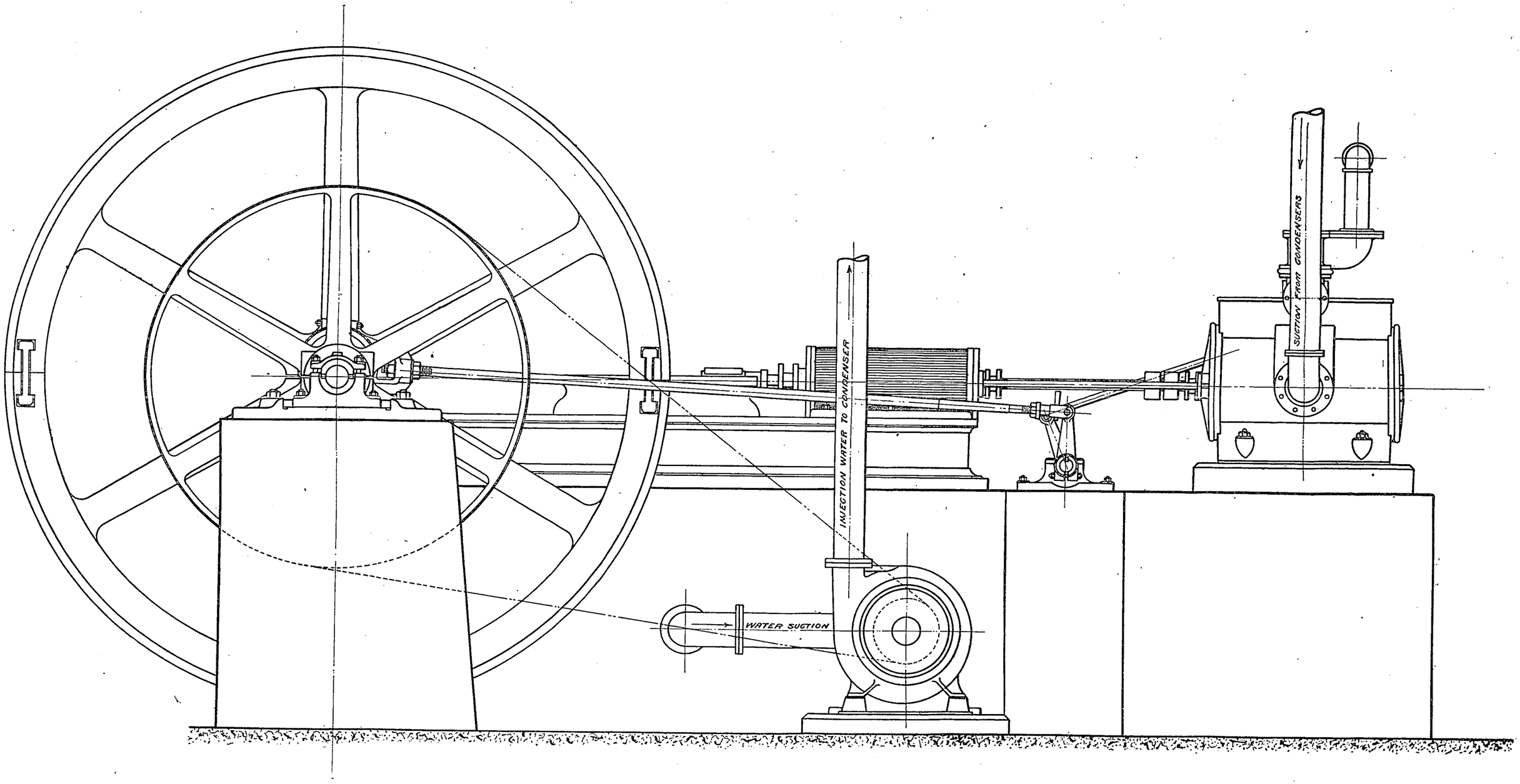
INJECTION WATER TO CONDENSER
SUCTION FROM CONDENSERS
WATER SUCTION

Figure 3.

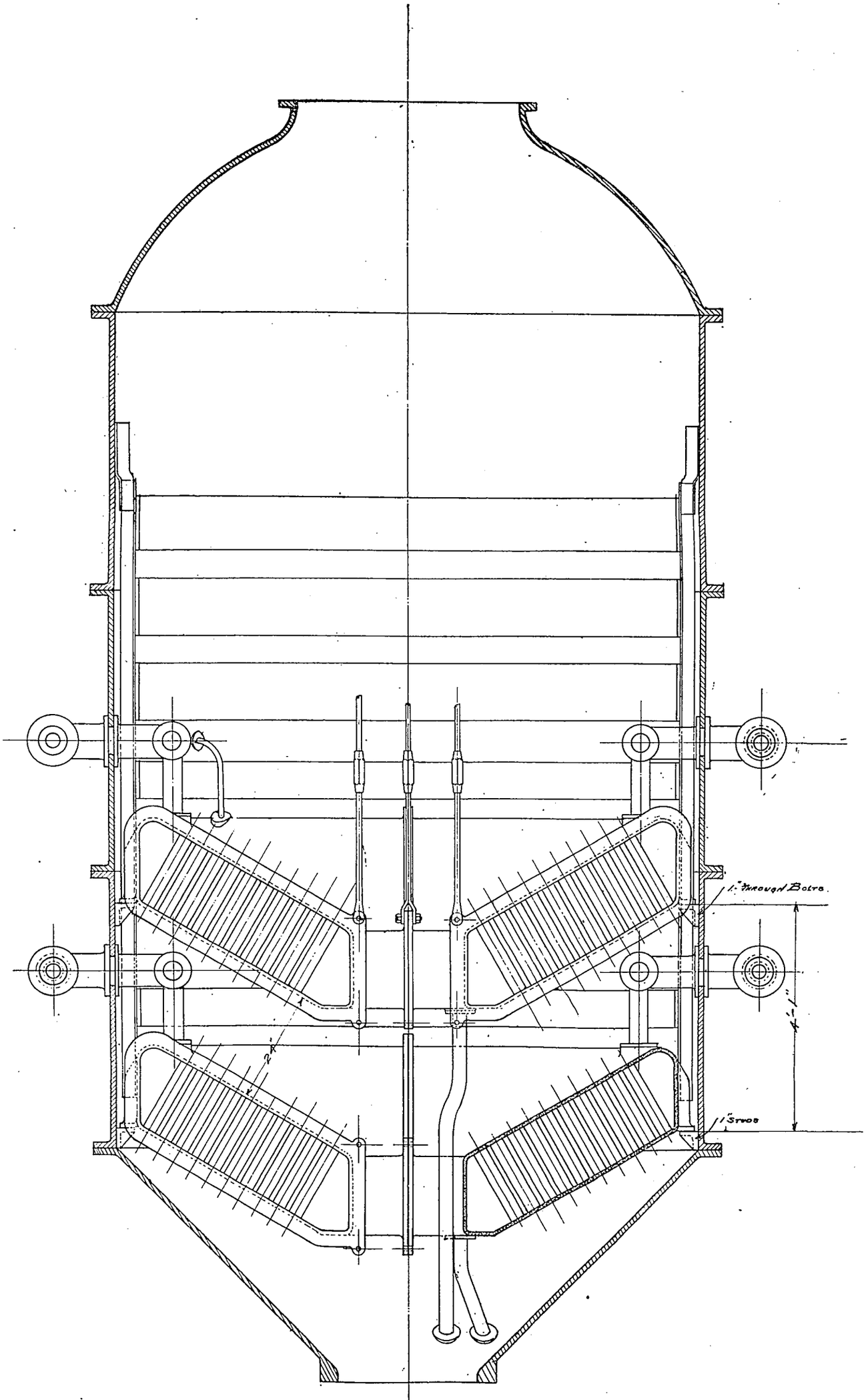

Figure 4.

applied to one of the Formosa Mills. In this case the water supply is by an electrically driven pump, the dry vacuum pump being steam driven.

Central Condensation systems are also being installed at the Hawi Mill & Plantation Company's mill and at the Hawaiian Agricultural Company's Pahala mill, this year.

FILTER PRESSES.

During the past year the Waialua Agricultural Company installed a battery of filter presses in its mill, the surface of the plates being cross-grooved, at right angles, leaving the supports for the cloth in the shape of rectangular pyramids about a quarter of an inch square.

The advantage claimed for this type of press is that about twenty-five per cent. more of the filtering surface of the cloth is available than with the ordinary parallel ribbed plates.

VACUUM PANS.

An interesting departure in vacuum pan construction is now being made at the Hawaiian Commercial & Sugar Company's Puunene mill. One of their coil pans is being fitted with what is known as the express heating system.

This is illustrated in "figure four," and consists of two shallow, conical heating bodies, with short tubes expanded in same, making a steam drum or calandria, practically on the same principle as some of our evaporators are constructed, the tubes, however, being much shorter, in this case being eighteen inches in length and three inches outside diameter.

The object of this type of pan construction is to make the whole heating surface available from the start of the boiling.

There are other constructions of pans in our mills embodying the same principles, such as the Griner pans at Lahaina, Lihue, Hanamaulu, etc., and the Braunschweigische pans at the Oahu Sugar Cimpany's mill. These pans are constructed, in each case, with a coil system in which the heating surface is kept as low down in the pan as possible, and the steam supply to same is from one central valve, necessitating, of course, that at the commencement of boiling the heating surfaces be submerged, by reason of which the boiling is more rapidly done than is possible with the ordinary coil system, which extends through the full height of the pan, so that in starting a strike only that portion of the heating surface which is submerged is available, the total heating surface of the pan being effective only when the strike is about completed. Another point that is very much in favor of the express system is the ease of cleaning same in comparison with any type of coil pan.

The operation of this pan during the next season will be of great interest.

REFINED SUGAR.

The results obtained at Honolulu Plantation during the past year with refined sugar have been most satisfactory.

The sugar produced has been of an exceptionally high grade —in fact, wherever it has been marketed, shipments having been made as far East as the Missouri river, it has set a new standard of quality for the refineries and beet sugar factories.

Paper No. 2.

Waipahu, Oahu, October 7, 1908.

W. J. Dyer, Esq.,
Chairman Committee on Manufacture-Machinery,
Honolulu.

Dear Sir:—In answer to your inquiry, the following figures, covering work done at the Oahu Sugar Company's mill for the 1907-1908 season, just completed, may be of interest to the members of the Hawaiian Sugar Planters' Association in connection with your report on machinery:

Tons of cane ground	238,840.00
Tons of sugar produced	35,319.00
As to the question of our biggest month's work, wish to say that this was the month of May, 1908, in which the tons of cane ground were	34,904.00
Tons of sugar produced	5,496.00

Our daily work during this time, per twenty-four hours of actual grinding, was as follows:

Tons of cane ground	1,556.88
Tons of sugar produced	229.00
Extraction (% sucrose in cane)	94.63
Dilution (% normal juice)	31.18

Speed of rolls, 24′ 10″ on the first mill to 29′ 0″ on the last.

Pressure on rolls, 360 tons on the first mill to 410 tons on the last.

As to the centrifugal work, beg to say that our centrifugal installation consists of sixteen water-driven centrifugals, with baskets forty-two inches in diameter and twenty inches in depth. Eight of these machines handled all of the sugar shipped, and eight of them handled the low grade.

Regarding our vacuum pan installation, this consists of one fifty-ton and one twenty-ton pan.

Wish to further add that no excess fuel, other than bagasse, was used during the whole season.

Very truly yours,

(Signed) P. A. G. MESSCHAERT,
Mill Superintendent, Oahu Sugar Co., Ltd.

NOTE:—It will be noted, from the tabulated statement, that the amount of cane ground per lineal foot of roll was 9.86 tons per hour, and the extraction 94.44% sucrose in cane, with a dilution of 31.85% normal juice, the work, as mentioned in the letter, being done without any excess fuel, other than the bagasse from the cane ground.

It will be further noted that the Hawaiian Commercial & Sugar Company's extraction was approximately the same, with a dilution of 13.48% normal juice only. At the same time, the quantity of cane ground per lineal foot of roll was only 81% of that ground at the Oahu Mill, per hour.

As a matter of further comparison, the Hawaiian Sugar Company's mill at Makaweli, obtained an extraction of 95.3% sucrose in cane, with 16.% dilution, but the quantity of cane ground per hour was only 5.59 tons per lineal foot of roll.

The above data, in each instance, refers to twelve roller mills and it is understood that the cane milled, in each of the instances above referred to, was of the "Lahaina" variety.

REPORT OF THE COMMITTEE ON MANUFACTURE OF SUGAR AND UTILIZATION OF BY-PRODUCTS.

To the President and Members of the Hawaiian Sugar Planters' Association:

Gentlemen:—Your Committee appointed to consider and report upon the progress of Manufacture of Sugar and Utilization of By-Products for the year 1908, has given the subjects some consideration, but owing to circumstances over which it had no control, a full committee report is not available.

The mill superintendent of the Honolulu Sugar Co.'s factory, Mr. F. Treskow, has sent a valuable communication on the subject of the use of "Formalin" for disinfecting juices and apparatus in sugar factories handed to your committee by Mr. Geo. Ross and which appears as follows:

Aiea, Oahu, T. H., September 1, 1908.

Mr. J. N. S. Williams,
Chairman, Committee on Manufacture of Sugar and Utilization of By-Products,
Kahului, Maui.

Dear Sir:—I am in receipt of your favor of August 20, which would have been answered earlier, but for my absence from the plantation for the past week.

As to the direction and scope of the report to be presented, I presume it will be proper to embrace all operations in the manufacture of raw sugar and the utilization of by-products resulting therefrom. I confess, however, I find it difficult to suggest any inovation under either of these heads not already touched upon in former reports.

The only thing that occurs to me at present as worthy of mention is the use of formaldehyde as a disinfectant and anti-ferment, in the treatment of cane juice in the process of manufacture. It has been used at Puunene I understand for several years past, and its value is fully known to you. Here at Aiea we have used it during the 1908 campaign with marked beneficial results. It is put upon the market generally in a 40 per cent. solution. We applied it in the proportion of 1 to 50,000 of the thin juice in the initial stage. The resulting benefits being absence of any sign of fermentation throughout the sugar house in any of the subsequent stages of manufacture, and the better keeping qualities of the heavy juices and syrups. Furthermore there has been no foaming of low massecuits in the crystallizers or yard tanks, sometimes observed formerly.

In the matter of utilization of by-products, nothing of special interest has developed within my knowledge not covered by previous reports on this subject. The question of distilling our waste molasses, which came into prominence on the passage of the law relating to denatured alcohol, does not now apparently arouse the interest it did on the passage of that law. The economic reasons for the failure, so far, of any active developments along this line, you are probably conversant with, as I understand you made a special investigation of the subject.

At Hakalau and Onomea plantations on Hawaii the surplus bagasse is baled in a cotton baling press and used successfully as fuel for donkey engine boilers, etc., at little or no expense.

You no doubt have had experience with burning waste molasses in bagasse furnaces. It has been used here, sprayed on the bagasse as it leaves the last mill, and also by means of a regular burner projecting into the furnace similar to an oil burner. There does not seem to be any difference in efficiency either way, neither is there any difference in either method as to sealing or obstructing boiler tubes.

I understand there are paper manufactories in Cuba in connection with sugar plantations, but whether bagasse, field trash, or both, is used, I can not say.

I enclose statement by Mr. Treskow, sugar house superintendent here, on the use of formaldehyde.

There is nothing else I can think of worthy of mention at the present time.

Yours truly,

GEO. ROSS,

Member, Committee on Manufacture of Sugar and Utilization of By-Products.

Mr. Geo. Ross,

General Manager, Honolulu Plantation Company.

Dear Sir:—Herewith I submit to you a statement regarding my

experience with the use of Formaldehyde during the operation of cane sugar house and refinery.

Formaldehyde, or Formalin as it is generally called commercially, is known as one of the strongest disinfectants and is used today in many beet sugar factories, refineries and cane sugar houses to stop or prevent fermentation of sugar juices and syrups in all stages of the process of manufacture. It is put on the market as a 40 per cent. solution. I have used it for a number of years past in beet sugar factories to prevent fermentation, adding the Formalin to the thin juice continuously at the first stage of the process only, in proportion of 1 to 50,000. When I took charge of the raw sugar house and refinery at Aiea on January 1, 1908, I introduced the use of Formalin for the first time in this factory with the same effect as formerly in beet sugar houses, preventing any fermentation throughout the house, as was not always possible in former years without the use of Formalin, noticeable in the end-products and low massecuites of the yard tanks.

During the season, the factory was not in operation over Sunday, and at the end of the season frequently stopped for two, and sometimes three days, the liquors, thick juices and syrups being left standing in the sand-filters, char-filters and tanks without any noticeable change in purity. There has been no foaming of massecuites in the crystallizers nor in the low massecuite yard tanks, which was formerly observed.

Yours respectfully,

F. TRESKOW,
Factory Superintendent.

The chairman of your committee, for want of a more interesting subject, has ventured on a Review of Factory work for a period of years back to 1888, as follows:

In all great undertakings participated in by many individuals associated together for long periods of special effort towards a particular end or object, there comes a time when it is of interest and value to pause in the onward career to review the past, and, in a manner, strike a balance which shall show the mistakes made, the experience gained, and the substantial advantages won.

The splendid results from the season of 1908 in yield of cane, outturn of sugar and the successful transportation of the crop mark an industrial achievement, the importance of which is not difficult realize.

We can now appreciate the far-sighted statesmanship of those public spirited men who gave time and energy to the establishment of this Association on the solid foundation upon which it now rests, because, had no such association been formed with its annual meetings, committees for exchange of ideas and results, and its Experiment Station and able scientific staff, there is no doubt whatever that insect scourges would have decimated our

fields, our milling plants would have been copied from those of more progressive peoples, our lands would have been worn out, and instead of the record crop of 500,000 tons of sugar, with lands, mills and transportation facilities in fit condition to produce like crops for the future, we would have been hard put to it to make ends meet; in a word instead of being leaders in our industry, we would have been followers of the lead of others.

All honor then to the founders of the Hawaiian Sugar Planters' Association.

During the years 1888-1892 there was much unrest amongst owners and managers of sugar plantations, average yields of cane were low, or at least were not high; average manufacturing results were poor, or at least were not good. An average yield of sugar from 3½ to 4½ tons per acre was considered high, and manufacturing losses of from 20 per cent. to 30 per cent. of the sugar in the cane were common. The following figures which were published at that time, and not contradicted, will prove this statement:

Hawaiian Com. & Sugar Co.'s crop 1889-1890:

Total yield of marketable sugar.....		8535 tons
Loss of pure sugar in bagasse.....	15.69%	
Loss of pure sugar in manufacture.....	10.90%	
Total loss	26.59%	

There were, however, a few diffusion plants working, one at Kealia, owned by the Makee Sugar Co.; one at Hamakua, owned by the Haiku Sugar Co., and one or two others in course of construction.

The Kealia plant had been working two seasons and produced good results as follows:

Total yield of marketable sugar.....		6570 tons
Loss of pure sugar in bagasse.....	4.1%	
Loss of pure sugar in manufacture.....	7.5%	
Total loss	11.6%	

The diffusion process, however, was not elastic enough to meet all conditions on Hawaiian sugar plantations, and a quantity of extra fuel was required, so that while the results in sugar were all that could be desired, the process did not meet with favor. Triple crushing with maceration followed, and in 1891-92 the Honolulu Iron Works Co. built a new mill for the Wailuku Sugar Co. consisting of three sets of two-roller mills from which the following results were obtained:

Loss of pure sugar in bagasse.....	7.09%
Loss of pure sugar in manufacture.....	10.74%
Total loss	17.83%

This was followed in 1894-1895 by a nine-roller mill purchased by the Ewa Plantation Company to replace a diffusion plant in operation at that mill.

This marked a distinct advance, as while extraction was fair, 92%-93% being easily obtained, the capacity of the mill was doubled, this being the main point desired at that time.

Numbers of nine-roller milling plants were put up all over the islands, and this seemed to be the limit of crushing machinery, but in 1902-03 Max Lorenz designed a fourth set of rollers which was built by the Honolulu Iron Works Company and put up at the Oahu Sugar Company's factory in continuation of its nine-roller mill and proved that extraction up to 95%-96% could be obtained, as well as increasing the grinding capacity of the plant. Up to date this is the last expression of the sugar house designer as far as extraction goes.

Improvements in manufacture have kept pace with those in crushing. and the following comparisons of work done in recent years will show the principal direction in which these improvements have been made; they are mainly due to better methods of manipulation, and to a much more extended system of chemical control in the sugar house, not forgetting that the use of "crystallization in motion" has been adopted in all recent construction of factories for sugar manufacture.

At the meeting of this Association held in 1903, it was resolved to make factory comparisons on a large scale, and the report of your Committee on Manufacture for the year 1904 brought out some valuable information. Comparing that report with the results taken from the weekly reports to the Experiment Station for 1908, we find the following:

Classification of factories—

	Class A.	Class B.	Class C.
1904	12	14	12
1908	30	8	..

which shows that in four years' time no less than 18 factories have improved their work to such an extent as to be classed with the best. There are, all told, 43 factories in this Territory, and of these 30 employ complete systems of chemical control as against 12 in 1904.

In 1904 there was one 12-roller crushing plant in operation; in 1908 there were six.

Referring to filter press work in 1904, only one factory was able to reduce the sugar in the press residues below 1 per cent.; in 1908 no less than nine factories were doing this. In 1904 nine factories reduced this waste to between 1 per cent. and 4 per cent., in 1908, seventeen factories were accomplishing this result. The remainder as far as is shown by the records are still doing poor work in this respect.

Similar figures are shown in extraction by mills; in 1904 only three factories, including one diffusion plant, obtained an extrac-

tion of sugar from that in the cane of 94 per cent. or over; in 1908 fifteen factories obtained these results.

And so it goes; it is believed that were accurate crop statements from all the factories in the Report Exchange available to your Committee on Manufacture, it would be found that the average percentage of loss of pure sugar at the present day in sugar factories that can be included in the A and B classes does not exceed 14%-15%.

Comparing this with the losses known to exist twenty years ago it will be seen what strides have been made in manufacturing results. Calling the average loss of twenty years ago 25 per cent., and that of today 15 per cent. the net gain of sugar on a crop of 500,000 tons is 58,800 tons of a value at $80.00 per ton of $4,704,000, a magnificent annual return on the capital invested in the Hawaiian Sugar Planters' Association, the credit for which is due to the various managers of plantations and their mill staffs, to the faithful and unremitting efforts of the gentlemen in charge of the Experiment Station, and to the interest shown by the Hawaiian Chemists' Association.

The past sugar season has been most remarkable for the unusual strength and purity of the original cane juices, for the uninterrupted period of fine weather during the crushing season, thus enabling a high average tonnage of cane to be ground, which, in conjunction with the richness of the juice, brought about a very high average output of bagged sugar; also for the high average price the product obtained at market. There have been several years when some of the above factors of success in sugar making were realized during the crop, but there are no records on file which show a season so generally favorable in every respect over the whole of this Territory; the results from which have reached the magnificent total of over 500,000 tons of sugar exported, having a value of over forty millions of dollars.

With such figures to point at, criticism of the methods employed would be of little avail, so that a retrospective review of the factory results obtained during the past season in comparison with those of years gone by, would seem to be peculiarly appropriate at this time.

In the Utilization of By-Products no advance over other years can be remarked; nothing has been done as yet in the manufacture of alcohol from waste molasses, and it is not probable that anything will be done for some time, since the working of the law permitting the manufacture of denatured alcohol free of tax has not produced the results looked for during the fall of 1906. Whether this is due to the spread of the anti-liquor movement throughout the United States, or to the failure of denatured alcohol to find the anticipated market is uncertain, the fact remains that capital has not been attracted by the large economic waste known to be going on in every one of our sugar factories, in the refuse molasses, sour and borer-eaten cane, mill washings, etc., to

say nothing of other sources of alcohol such as pineapple scraps, and so forth.

It is reported that a method of exhausting molasses of its sugar contents has been developed at the Maui Agricultural Company's mill at Paia, but Mr. P. J. Foster, its originator, is not yet prepared to make public the details and results.

The scums from the filter presses are utilized by being spread upon the land for fertilizer, the bagasse or refuse cane after crushing is used for fuel, and the mill ashes are disposed of for road material, or top dressing on the fields in accordance with individual ideas, all in much the same manner and with much the same results as formerly, so that your Committee thinks that the statement that no advance has been made in the utilization of by-products, while regrettable, is strictly true.

In closing this report your Committee feels that special note should be taken by this Association of the excellent results due to the exchange of weekly Mill Reports, which are shown by the large number of sugar factories now included in Class A, as compared with those in 1904; and your Committee is strongly of the opinion that this exchange of reports should be continued, and still further elaborated if that be practicable.

It is doubtless gratifying to the individual to be ahead of every one else, but results of moment are obtained when the community is leading all other communities in its own particular line, and this can only be done by exchange of ideas, and accurate reports of results, thus spurring the individuals to increased efforts, and by reason thereof raising the general average of excellence.

Respectfully submitted,

J. N. S. WILLIAMS,
Chairman.

REPORT OF COMMITTEE ON WAREHOUSES FOR, AND STORAGE OF, RAW SUGAR.

To the President and Members of the Hawaiian Sugar Planters' Association:

Gentlemen:—I was requested by the Secretary of this Association to act as Chairman, with Mr. B. D. Baldwin, Mr. J. T. Moir, and Mr. J. N. S. Williams as members, of the Committee on Warehouses For and Storage of Raw Sugar, in place of Mr. C. B. Wells, who contemplated leaving the country and had planned his departure to escape this meeting of the Association. I quite disapproved of the course taken by both Mr. Wells and the Secretary, but neither of them seemed amenable to reason.

Mr. J. N. S. Williams' contribution towards this report is so

complete in itself, it will be presented in full as a part of this report.

In order to ascertain conditions existing elsewhere I addressed letters to a number of managers of plantations representative of the varied conditions throughout the islands, and from their replies find that as a rule on the lee side of the islands where dry weather prevails, but little attention is required in warehouse construction or method of storing, to insure sugar keeping in good condition. But in localities where more moist conditions of climate exist; where the prevailing wind is usually rather high and comes from over the sea, or where wet or showery weather is the rule rather than the exception; careful attention must be given to the proper construction of warehouses for the prevention of sweating of sugar during storage.

I also learned that almost without exception sweating of sugar is attributed entirely to atmospheric moisture, for, as is claimed, sweating occurs during foggy or wet weather, or when the humidity is high and particularly if accompanied with high winds, and practically never when the weather is dry.

It seems also that sugar stored in warehouses near the sea coast does not keep as well as the same sugars when stored at the mills located farther from the coast.

There seems to be quite a divergence among plantations in the matter of warehouses. Some have concrete floors, others have two thicknesses of lumber for floors, the upper layer often of T. & G., others, again, depend on one thickness of T. & G., while many seem satisfied with one layer of rough lumber with open seams.

There are many warehouses with an outer covering of corrugated iron, but more frequently the sides are 1x12 battened. Some have lined the walls with T. & G. or 1x12 battened, but there are several who depend on one thickness of 1x12 battened, for side walls. All of the managers, excepting some of those on the lee side of the Islands, from whom I received replies, admit that they have at times suffered considerable loss and annoyance by the sweating of sugars. Some attribute their present immunity to certain alterations made to their warehouses, such as closing up all openings including those originally left for ventilation, masoning up around under sills of warehouses to prevent circulation of air under the floor, lining inside of warehouse with 1x12 battened or T. & G., etc.

Mr. Fairchild of Kealia seems to have escaped the evils of sweating sugar for some time, but in his case, he believes the improved conditions are due to changes in Boiling House methods. He mentions "that like many other plantation matters, what meets his conditions may not be applicable under other conditions." But, as it is quite possible the methods adopted at Kealia may suit some conditions elsewhere, I have made that portion of his letter a part of this report, which reads as follows:

"We have had our troubles over sweating sugars and believe they occurred chiefly in sugar made from over-limed juice, sacked and piled while still hot.

"Now every strike of No. 1 goes from the pan to crystallizer where low grade sugars are added and all allowed to cool in motion from two to four hours before drying.

"The resultant sugar is conveyed to a large box and later sacked and not piled until cooled down to atmospheric temperature.

"We have employed this practice now for some years shipping but one grade of sugar and our polarizations are invariably higher at port of destination than here, and we have kept trial lots for months without deterioration. We believe in working the factory as nearly neutral as possible, paying strict attention to good clarification and liming, cooling down all strikes of sugar in which the low grades are well mixed at time of cooling. The addition of an extra film of lower grade molasses on the crystal seems to provide an antiseptic covering which protects it from infection, especially when it is cooled down properly before drying.

"We also use Formalin in the crystallizer if the need for same is apparent. This plan has relieved us of all troubles with sweating sugars, and falling polarizations. We aim to make all sugars polarize 96.7 and can do so by adding more or less lower grade sugars to the strike in the crystallizers." * * *

As modern warehouses are provided with solid concrete floors, I rather expected to find the majority of mills using them, but they seem invariably to have retained the wooden floor.

North Kohala is considered even during fair weather to be one of the damp districts of the islands, and is particularly so during showery weather. A district where loose sugar left exposed soon stands about as thin molasses and all floors where there has been any handling of sugar become damp and sticky. Where leather goods grow mouldy in a night, and where even the dentists who periodically visit the district must often use steel files on their patients, their ordinary dental paper files being too limp for use. In this district the Hawi Mill & Plantation Co. struggled for many years with sweated sugars on wood floors with air circulation beneath, but happily, since substituting them for solid concrete, absolutely no sweated sugars are found next to the floor. It was therefor somewhat of a surprise to find so many mills still hold to their wooden floors, and still more of a surprise to have from a plantation manager on Kauai a statement that their sugar keeps well on wooden floor, but is disposed to sweat when stored on concrete, which recalls to my mind an instance where concrete floors nearly "got a black eye." Concrete floors, by the way, require several months after construction in which to thoroughly dry out. In this instance sugar was stored on the concrete when the floor was about a month old, and when sugar was removed it was found necessary to return to the mill all bags of the bottom layer, and a good many of the second. Concrete floors were, of course, pronounced a dismal failure for the storage of sugar, and a layer of

planks put down over it on which to lay the sugar. This did very well until some stupid workman placed a quantity of sugar on the bare concrete, which on being removed sometime afterwards was found to be, if anything, in better shape than that on the wood. The planks were removed and put to other use, since then only concrete floors for storing of sugar are considered.

It is the opinion of your committee that wood floors, however carefully or elaborately they may be laid down, cannot be made as satisfactory as concrete floors for the storage of sugar. More or less fine sugar is bound to be left (even if floor is swept with a broom) which becomes moist during damp weather and is absorbed by the wood, to be taken up by the dryer sugar when placed upon it. While concrete can be swept clean and when necessary washed and in a very short time is again in perfect condition for sugar.

After careful investigation your Committee recommend that in the construction of warehouses for the storage of Raw Sugars *solid concrete floors* should be employed, and while a frame of structural steel might make the most perfect building, it will not enter into the scope of this report. Wood frame will fill all reasonable requirements, and the material used if of liberal sizes will allow of wide spacing. The outer edge of concrete floor should be raised a few inches on which to rest sills of building so that when washing floor, moisture will not be communicated to the wood work. Sides and roof should be of corrugated iron, and in order to close corrugated spaces which would otherwise be left open, the upper ends of top sheets on roof sides should butt against a strip of wood the full thickness of a corrugated sheet, and corrugations in lower edge of side walls next to sills, filled with concrete or other suitable material to exclude wind and water, and under eaves the same process followed. In cases where sides of roof face a strong prevailing wind, sheet lead over the peak hammered down into corrugations before putting on ridging will be effective. All horizontal or end laps of corrugated iron should have strips of tarred cloth, felt or other suitable material put between the sheets before being nailed down, and all other, or side laps covered inside and out with strips of strong cloth or canvas. Such strips of canvas to cover laps on corrugated iron are in vogue at Puunene and have proved extremely efficacious.

Particular attention should be given to doors and other openings to have them tight when closed, and when possible avoid having them on windward side, but placed in such position that when opened (during wet weather, at least' a current of air will not be created through the building. Last year I visited Hawaii's latest sugar mill with its large sugar room warehouse annex. Its railway track runs through this building in the same general direction as the wind, and the doors always open accounted to a great extent, I believe, for the excessive quantity of sweated sugar present.

The proper height of wall for a warehouse is often a matter of opinion and is largely determined by the particular conditions or requirements of each. The general rule seems to be from ten to fourteen feet. In Hamakua Mill Landing Warehouse the sugar arrives from the mill in cars on a track placed above the tie beams 12 feet from the floor, and when shipped is delivered into cars running through the center of the house, with track sufficiently depressed to bring floor of cars on a level with warehouse floor. The advantages of this plan are too apparent to need further comment.

A solid concrete floor is also a great protection against fire (particularly if sides and roof are of corrugated iron)—and will easily pay for itself in the lessening of risks. To illustrate: The Hawi Mill & Plantation Co. originally had a large warehouse which though covered with corrugated iron had wood floors raised from one to three feet from the ground. One early morning just after several hundred tons of freight had been loaded into it from a San Francisco vessel, the warehouse, or at least the contents mysteriously caught fire. Successful endeavors were made for a few moments to save some of the goods, but as soon as a portion of the floor fell through, the heat as usual stimulated a draught which carried the flames along under the floor from one end to the other, and it was not many minutes before the whole floor was on fire. The frame of the building was of wood but the sides and roof fell only after the floor and contents of building had been burning for some time. The only property saved, aside from that of the first few minutes, was a quantity of kerosene oil stored in a room adjoining, in fact a part of the warehouse, but fortunately with a solid concrete floor. This room was on the lee side of the main warehouse and was only discovered to be intact some time after all hopes had been given up of saving anything of the main warehouse. Being on the lee side, the men owing to the heat were only able to work at short intervals, otherwise the whole instead of only half of the oil would have been saved. This oil room stood for some time after the warehouse had collapsed, and it seemed reasonable to assume that had the whole floor been concrete much of the valuable cargo might have been saved, and as likely as not the building itself.

As regards the *Storage of Sugar:* Most of the sweating sugar, by all accounts if the floor is of concrete, is generally on the outside of the pile; it would therefore seem, so far as is practical, sugar should be stacked in one continuous pile rather than in smaller lots, thus reducing the area likely to be affected. And if sides of buildings are of corrugated iron and made absolutely tight as suggested, sugar could be piled with reasonable safety close to, or at least within a few inches of the wall. If, however, of T. & G. a wider space should be allowed. If of rough lumber battened, a space should be left wide enough for a passage along wall, and sugar covered with tarpaulins particularly on windward

side. The object sought in every instance should be to prevent as far as possible any damp air coming into contact with the sugar. In the district of North Kohala, noted as was previously stated for its damp climate, sugar is often kept between seasons for several months with little preceptable injury if properly covered with tarpaulins, while any left uncovered and subject to a free circulation of air, will after a few weeks occupy considerable space along the floor, on the wrong side of the bags in the shape of molasses.

Respectfully submitted,

JOHN HIND,
Chairman.

Nov. 2, 1908.

Kahului, T. H., Sept. 28th, 1908.

John Hind, Esq.,
Chairman of Committee on Warehouses
For and Storage of Raw Sugar.

Dear Sir:—The past shipping season has been, in respect of climatic conditions, almost the direct opposite of the shipping season of 1907. The season for 1907 was, at Kahului, remarkable for the humidity of the atmosphere and high trade winds, and the very large amount of sugar kept on hand in the storage warehouses at all times during the season, due to difficulties in the shipping arrangements at the commencement of the season, which caused a great accumulation of sugars in February and March. The shipping arrangements thereafter somewhat improving, were just sufficient to keep the mills clear of their product, consequently, a very great proportion of sugars that were stored during February, March and April were carried over until September and October and not shipped until the last of the season. The weather all through the shipping season was humid with high northerly winds, and the loss through sweating in the warehouses, not only at Kahului, but also at the mills, was very great, amounting to thousands of bags out of each warehouse.

This attracted my attention to such an extent, that I made inquiries in different parts of the islands and found that, while our experience at Kahului was similar to that of all shipping ports on the weather side of the islands, shippers who had their warehouses on the lee-side of the islands suffered little from sweating.

It therefore seemed to me that sweating of sugars in store was not due to any inherent defect in the sugar itself, but must have been due to conditions, climatic or otherwise, over which storers of sugar have no control.

The conditions of the shipping season of 1908 were, at Kahului, similar to those of 1907, in respect of having at all times very large amounts of sugar on hand in the warehouses at the port

and at the mills, but the weather conditions were very different. The trade winds, which have prevailed continually throughout the season, have come more from the East than they did last year and the atmosphere has not been anything like as humid, with the result that, while sugars have been kept in store in warehouses at Kahului for a length of time equal to that of last year, the loss by sweating has been so insignificant as to be not worth mentioning, due principally, I believe, to the dryness of the atmosphere.

We have determined the following facts with regard to the construction of warehouses:

(1) Solid concrete floors when thoroughly dried out are better for storing sugar on than wooden floors.

(2) Wooden floors should be double, with sheathing felt or paper between the thicknesses of the floor.

(3) The sides and roofs of the warehouses should be as tight and weather proof as possible, especially on the windward side.

(4) Sugars should be piled so that there is a space of 18 inches to two feet between the tiers and the sides of the warehouse.

(5) The floors, if of wood, should be sprinkled with slacked lime well broomed in to neutralize any acidity that might be in these floors tending to start sweat in the bags.

The above mentioned precautions taken in building warehouses and storing the sugars will help matters along considerably, but they will not obviate damage to sugar in store when the weather is humid.

It may not be out of place to call attention at this point to the fact that the removal of hatches from sugar ships when at sea in order to ventilate the holds is not conducive to the delivery of clean cargoes on the Atantic Coast. The Charter Parties under which ships are loaded with sugar in nearly all instances, distinctly specify that the hatches shall be opened during fine weather so as to ventilate the holds. This has been responsible in one instance, that of the "Erskine M. Phelps," which vessel took a load of sugar from Kahului for New York early in the season of 1908, for the delivery of the cargo in very poor condition, over 20% of the whole cargo suffering from fresh water damage, in other words, "Sweat." It is to be hoped that this clause in sugar Charter Parties will be cancelled, as, unless a captain gets instructions to the contrary from his charterers, he is compelled to open his hatches, or take the consequences should damage of any kind show itself on his cargo upon delivery.

Trusting that you will find this of use, I beg to remain,

Very truly yours,

J. N. S. Williams,
Member of Committee.

REPORT ON FORESTRY.

To Mr. F. A. Schaefer,
President Hawaiian Sugar Planters' Association.

Sir:—There has been no radical change or development in Forestry conditions in the Hawaiian Islands during the past year.

EXPORT OF OHIA TIES AND LUMBER.

The most notable event has been the beginning of operations by the Hawaiian Mahogany Lumber Company, Limited, in the production and export of Ohia ties, in filling the order for 2,500,000 ties contracted to be delivered to the Santa Fe Railroad.

A large saw mill has been erected at Pahoa, in the District of Puna and Island of Hawaii, and operations were begun there late in September last. The first shipment of approximately 20,000 ties is now being loaded on to the Emily F. Whitney at Hilo.

UTILIZING WASTE.

There is a very large waste in making ties which the lumber company is endeavoring to utilize in by-products. Hardwood boards and battens to a considerable amount have been incidentally produced and a shipment of 15,000 feet were sent to San Francisco on the last Enterprise. It is believed that a market for a considerable amount of by-product lumber of this nature can be found, both here and at the Coast.

The chief drawback to this lumber is its tendency to warp; but it is believed that by piling and curing the same under proper conditions this difficulty can be obviated.

The Ohia lumber is so hard and tough that it is believed that it can be used to good advantage as flooring and siding for cane cars which, when made of Douglas fir, wear out rapidly. The company will soon have stock enough on hand to furnish this lumber to those desiring to try it.

The company is also taking steps to produce telephone pins and brackets from other portions of the waste lumber, there being a large demand for this on the mainland.

TIES FOR ISLAND USE.

Incidental to the manufacture of ties for the Santa Fe contract, the company is also producing from the smaller timber ties for local use at prices which compete with redwood ties, while being much better and more lasting in quality than the redwood ties.

Ties have been furnished by the company to the Hilo Railroad, the West Hawaii Railroad, the Koolau Railroad, the Oahu Railroad and to the Ewa, Waialua, Makee Sugar Company, Makaweli, Lihue and Koloa sugar plantations.

Ties are also being furnished to Lewers & Cooke, who intend to keep them in stock.

CULTIVATED VS. UNCULTIVATED FORESTS.

The fact that ties can be manufactured and exported from here to the Coast, and manufactured and sold locally to successfully compete with the heretofore cheap lumber of the Pacific Coast again brings to the front the subject which has been so frequently urged upon the sugar plantations that one of the greatest economies which they can practise is to plant trees for railroad ties, fence posts and firewood.

There are but few plantations left so located that natural forest supply can be relied upon for these purposes. Even where natural forest is still available therefor, the supply is so limited that a very few years will end the supply.

More and more of the sugar plantation managers are recognizing this fact and the last year has seen a constantly increasing number who are taking advantage of the offer of the Forestry Department of the local government to furnish foresting plans and recommendations and send an expert on to the ground to lay out and advise concerning the location and character of nurseries, kinds of trees to be planted and location of planting grounds.

In this connection the writer was, many years ago, greatly impressed with the results obtained on the Lihue Plantation by plowing up land and cultivating a planted forest area as compared with the simple holeing and planting of trees and leaving them to their fate.

The rapidity of growth and the thrift of the cultivated trees as compared to the others was most striking.

A couple of years ago the writer suggested to Mr. Louis von Tempsky, manager of the Haleakala Ranch, to try the experiment there. Mr. von Tempsky, who is an enthusiastic tree planter, followed the suggestion, and has achieved remarkable results which are best set forth in his own language. The following is his report of the results.

REPORT OF L. VON TEMPSKY ON CULTIVATED VERSUS UNCULTIVATED LAND FOR TREE PLANTING.

"It was suggested to me that I try an experiment in tree planting on the above *lines*, to find out the difference in the cost and results of the two methods.

"In September, 1907, I measured off a rectangular piece of land containing exactly four acres. One acre I furrowed out, and

"kipikuaed" holes six feet each way. The other three acres I plowed and harrowed twice, and as the manienie sod was very heavy I had to hand work the whole piece, going over it with "kipikuas" and packing out what wouldn't burn; as the weather was quite wet I could not get a fire on the grass prior to plowing; this of course made the preparation of the three acres very expensive. I selected this spot especially as I thought it would be a good place to determine the maximum cost of preparing land for planting trees in this style.

"The seedling trees I selected were, Eucalyptus Amygdalina, E. Botryoides, E. Corymbosa, E. Corynocalyx, E. Leucoxylon, E. Paniculata, and E. Rudis, which were recommended to me by the Australian Forestry Service as being considered by them to be among the best of their trees for railroad ties and fence posts.

"The cost of the two pieces is as follows:

One Acre Lot.

Furrowing	$ 2.60
Holeing	3.60
Planting	2.60
Weeding to date (twice)	9.60
	$ 18.40

Three Acre Lot.

Plowing	$ 16.09
Harrowing	3.15
Kipikua work and twice weeding	102.70
Holeing	17.44
Planting	7.52
	$146.90

Or $48.97 per acre.

"The holeing of the three-acre piece cost more than it should have done, as owing to running out of seedling trees, planting of about half this lot had to be postponed, and the holes dug over again.

"To offset to a certain extent the cost of the three-acre lot, I thought it would be as well to try some quick growing crop that would not take up too much room, and would to as small an extent as possible retard the growth of the trees. I selected California potatoes, and treated the seed to a bath of sulphate of copper, to see if that would prevent the rot that is so prevalent in Kula.

"Last July notwithstanding the rot that did attack them, and the exceptionally dry weather that we have had all this year, I took off a crop of potatoes that *netted* me $69.19. This amount deducted from the cost, $146.90, left $77.71 or say $25.90 per acre for the three acre piece, as against $18.40 for the uncultivated acre.

Results.

"One year from planting the trees the following measurements were made:

"The tallest tree in the *uncultivated* lot was 5 feet 3 inches, a Eucalyptus Botryoides, and the average height of the whole of that piece was 3 feet.

"In the *cultivated* lot the tallest tree measured 16 feet, Euc. Rudis, the other tall ones being: Euc. Botryoides, 15 feet; Euc. Corynocalyx, 12 feet; Euc. Leucoxylon, 12 feet; Euc. Paniculata, 12 feet; Euc. Corymbosa, 6 feet.

"The best average height, and the evenest grown lot of trees was the Euc. Botryoides; the poorest being the E. Corymbosa. The average height of the whole three-acre lot was over 10 feet. One stray (Blue Gum) Euc. Globulus, that was accidentally planted in the cultivated lot measured 12 feet in height. This tree had exactly the same treatment the others had, which goes to show pretty well, that both Rudis and Botryoides, are faster growers than the Globulus; both these species are ranked very highly in Australia for railroad ties, and fence posts. This is well to be known, especially as the Globulus, or Blue Gum, is the Eucalyptus most commonly grown at the islands, and, except for firewood, is the poorest for any purpose.

"Considering the unusually dry weather we have had for the last twelve months, I consider the growth of the trees in the cultivated lot remarkable.

"Under normal conditions, that is, where there is not a heavy growth of manienie to contend with, the cultivation of the trees should cost very much less than the amount above shown.

"The difference in favor of the cultivated as against the uncultivated trees is so great in favor of the former, that I shall favor the cultivation of all trees hereafter planted on the ranch, wherever the location is such as to make it possible.

"As showing what the possibilities are of fence post production, I would call attention to figures heretofore reported, viz: That last year I cut 244 good fence posts, five to twelve inches in diameter, from 38 second growth Eucalyptus Rostrata trees, twelve years old. Some of these posts have been put in the ground plain and the balance subjected to Creosote treatment by the Kahului Railroad Company. All of these posts will have the date stamped on them, and the place of use recorded in the ranch forestry book; so that their respective life in the ground can be ascertained accurately."

The foregoing results, I submit, are such as to more than warrant all plantations, especially those which use railroads and have large amounts of fencing to do, experimenting with cultivated forestry.

GENERAL RE-FORESTING FOR CONSERVATION PURPOSES.

This subject, like the poor, is always with us. What has been said and repeatedly re-said on this subject is today more vital to the agricultural interests of Hawaii than ever, and in no case more so than to the irrigated sugar plantations.

On every island forestry reserves have been set apart on paper, but scarce anywhere has there been anything but the most limited attempt at re-foresting.

Under normal conditions, protection from live stock would be sufficient, as the forests would reseed themselves.

For several reasons this does not take place in most locations in Hawaii. The multitudinous insects which devour the forests and a root fungus which is killing the natural woods by thousands of acres in a number of localities and the heavy growth of the Hilo grass and other coarse grasses which so cover the ground that seeds cannot germinate, are rapidly destroying forests in regions where water conservation is most needed.

Whether or not the entomologists can introduce parasites which will neutralize the deadly effect on forests of insects and fungus growths is now being made a subject of study by the Planters' Experiment Station. It will probably be far more difficult to obtain results than it has been to meet the ravages of insects directly attacking the cane; but the incidental effect upon the sugar plantations is so great that no effort should be spared to obtain results in this direction.

ARTIFICIAL REFORESTING.

Irrespective of the arrest of the decay of the forests, re-foresting should be actively taken up at an early date, on a large scale, both by the government and by private interests, or the flow of water on a number of the watersheds is liable to be seriously diminished.

The watershed most urgently in need of rescue and reforesting is that of the Kohala mountain, on Hawaii. A large portion of this, under private ownership, is still being overrun by cattle, resulting in the continued recession of the woods. A considerable area of private lands should be secured by exchange or purchase and replanted at the earliest possible date, or diminution of the water flow will certainly follow.

Next to Kohala the watershed area which, in my opinion, most seriously needs attention is that of the Ewa basin and the district of Waialua, on the island of Oahu.

The amount of water flowing or being pumped from the supply furnished by this small watershed is something enormous, amounting to several hundreds of millions of gallons per day. Droughts affect the quantity of the artesian supply, and no possible step should be left untaken to protect, conserve and increase the product of this watershed.

A paper line of forestry reservation has been located and partially fenced, but systematic tree planting to further conserve the water flow and prevent its running off in storms, should be systematically taken hold of by the plantations, which depend upon this supply for their irrigation. The government owns but little land in the district and cannot be expected to do much. So far the only tree planting has been done by the company which is the least interested in the direct conservation of water flow, viz: the Oahu Railway & Land Company. It has, at a limited expense, made such a fine showing upon the top of the Waianae mountains that its example is worthy of emulation on a larger scale by the sugar plantations interested.

THE GOVERNMENT FORESTRY.

So far, the appropriations for government forestry have been insufficient to do anything more than create forest reserves and a skeleton of administration of the same. No appropriation has been provided for forest rangers, forest fencing or replanting, or for fighting fires. A skeleton is as essential to an advanced forest policy as it is to a man; but in the one case as in the other, it is of no practical value, except for show purposes, without the conjunction with flesh and blood. The flesh and blood necessary to make our forest administration a living organization, are appropriations to go ahead and do something with the efficient frame work already created.

I think it would be eminently sound for this Association to formally pass resolutions, recommending the coming Legislature to make appropriations for these subjects, and for the members hereof to individually interview their several Senators and Representatives, urging their support to such appropriations.

I submit herewith for consideration of this Association a form of resolution suggested:

"*Resolved,* That in the opinion of the Hawaiian Sugar Planters' Association the work of forest protection and extension is of the highest importance to the agricultural interests of this Territory;

"That in the opinion of this Association the time has arrived when liberal appropriations should be made for such protection and extension, and we hereby petition the Legislature to make liberal specific appropriations for forest fencing; for rangers to inspect and protect the forests from fire, depredation and trespass and for replanting with trees areas which have been heretofore denuded of forest."

Respectfully submitted,

L. A. THURSTON,

For Committee on Forestry.

PAPER READ AT THE ANNUAL MEETING OF THE HAWAIIAN SUGAR PLANTERS' ASSOCIATION NOVEMBER 11, 1908.

By Ralph S. Hosmer, *Superintendent of Forestry.*

Once again it is my privilege to address the members of this Association on the subject of Forestry in Hawaii. The topic is by no means a new one on the program of your annual meetings and to some it may perhaps seem that everything necessary to a correct understanding of the subject has already been said. But there are good reasons why forestry should continue year after year to hold a place in your deliberations. Forestry is very decidedly a live issue in the Territory of Hawaii. It is a part of the general land question, than which there is no more important local problem. In Hawaii the relation between forestry and irrigation is peculiarly intimate. The continued success of the main industry of the Territory rests on the wise use of water. Over half of the fifty odd sugar plantations are dependent on irrigation. The majority of the non-irrigated plantations also use large quantities of water for fluming cane or for the development of power. Because of the characteristic features of Hawaiian climate and topography—the heavy precipitation in the windward districts and the steep, short watersheds—it is essential that a forest cover be maintained permanently on the catchment basins of the important streams. The conservation of the native forest has consequently a very direct bearing on the continued commercial prosperity of the islands.

But the benefits of forestry do not cease with forest protection. The question of meeting the demand for wood and timber of the various classes required for local use, not to speak of the need for fuel in certain districts, becomes each year more and more pressing. It is the province of forestry to meet this demand through the introduction and establishment of trees that will in time supply the required products, be the need for posts, railroad ties, construction timber, or fuel. Then too, on the side of windbreak, shelter-belt and incidentally of road-side and ornamental tree planting, forestry touches the life of this community at many points.

Taken altogether the problem of using the forests wisely and of making them do their full part constitutes one of the vital issues in the Territory of Hawaii. And because forestry is a vital, a living issue it necessarily follows that not only do new problems constantly arise, but also that the old problems frequently take on new phases or develop relations not before appreciated.

As a body the members of this Association are brought into more direct relations with forest problems than is any other class of citizens in Hawaii. It is therefore pertinent that at your meet-

ings the underlying principles of forestry should be stated often enough to be kept clearly in mind, and that the aims, objects and present condition of current work should be made known through frequent reports of progress. It is for these reasons that forestry holds its place on your program and comes up yearly as a subject for discussion and report.

During the year of 1908 the many-sided importance of forests has come to be recognized as never before in the history of the Nation. Last May the President called together at the White House the governors of all the States of the Union to meet with him to discuss the conservation of the natural resources of the Nation. This meeting was an event of far reaching importance for it marks the starting point of many movements that have to do with the wiser use, not only of the forests, but also of the other great natural sources of wealth—lands, minerals and waters. At the Governors' Conference, Hawaii was represented by the Governor of the Territory and by three "advisors," one of whom was the secretary of your Association.

Following the Conference of the Governors, and as a direct result of that meeting, the governors of many of the States have appointed local conservation commissions to undertake an inventory of local resources and to assist in outlining a plan whereby the material resources of the Nation as a whole can be used wisely, without waste or unnecessary loss. Governor Frear has appointed such a commission for this Territory and data are now being collected as the basis for a report that will contain specific recommendations. Many of the problems of conservation are essentially local in character and can only be solved by plans resulting from the detailed and comprehensive study of individual localities. Others are shared in common by this Territory and by the States and Territories on the mainland in a way that a better understanding of the whole subject is making more and more clear. In so far as Hawaii has taken part in this general movement it is unquestionably the most notable event in the history of forestry in the Territory during the past year.

With the widening in scope of the general outlook the work of the Territorial Forest Service has gone steadily forward. Pursuing the policy adopted at its organization, five years ago, there have been set apart during the past year additional forest reserves amounting in area to 46,429 acres, of which 21,094 acres, or 45 per cent., is Government land. This brings the total area of the Hawaiian forest reserves, now sixteen in number, up to 444,116 acres, of which 273,912 acres, or 61 per cent., belongs to the Government. Forest Reserve projects amounting to a total of 62,180 acres now only await formal action by the Board of Agriculture and Forestry and the Governor before being set apart. The most important forest reserve projects now pending are the proposed Kohala Mountain Forest Reserve on Hawaii, and the proposed Lihue-Koloa and Kilauea-Aliomanu Forest Reserves on Kauai. With the setting apart of the two last named proposed reserves,

the entire upland region in the central part of Kauai will be included within the forest reserve limits, making Kauai the first island on which the reserve system has been brought to completion.

Reference to the forest reserves brings up a matter in which this Association can by its influence and support be of material assistance in strengthening the forest policy of the Territory. As has been frequently pointed out the primary value of the Hawaiian forest lies in the protective influence it exerts on the watersheds of the streams needed for irrigation. Consequently practically all the forest reserves are essentially protection forests, which it is desirable should be held strictly intact. This means that the reserves must be protected from fire, from cattle and from other forms of trespass, and must be rid of wild goats and other destructive animals. So far as possible the boundaries of the reserves are made to follow natural barriers. But it often happens that there are stretches where fencing is required. In many cases a short stretch of fence, as for example between two gulches, will protect a large area. Often such stretches of fence should be on Government land where it is impracticable to make fence building a condition of a Government lease. To meet such contingencies and also to provide for the fencing jointly by the Government and a given corporation of certain forest lines, there should be available an appropriation on which the Division of Forestry could draw. The amount need not be large. Five thousand dollars would go a long way in such work. But some money certainly should be available.

Two further matters of similar tenor should also be mentioned in this connection—the inauguration of a definite system of administration of the forest reserves by forest rangers, paid out of Territorial funds and responsible only to the Territorial forest officials; and second, the appropriation of a fund, to be used only in case of emergency, from which could be paid expenses incurred in fighting forest fires. Not until the Hawaiian forest reserves are properly protected by the necessary fences, and adequately guarded against fire and trespass by a forest ranger force, backed by an appropriation for fighting fire, can the reserves do their full duty or be made of the greatest benefit to the Territory.

In saying this I do not forget the excellent work that has for many years been done by a number of the large plantation companies in carefully protecting their own forest lands, nor do I under-estimate the strong sentiment in favor of forestry that has made possible what has already been accomplished by the Territorial officials. But looking to the future, as it is essentially the business of the forester to do, I cannot but urge most strongly that the members of this Association, both collectively and as individuals, exert whatever influence they may have to secure from the coming Legislature appropriations sufficient for these purposes."

The second main line of forest work in Hawaii is tree planting.

It was in this way that both the Government and the private owner began to practice forestry in this Territory. I do not need to remind you of the good work that has been done with increasing interest for the past thirty years. But I do want to bring home to you all the desirability—nay the necessity, of doing more of it.

In Hawaii there are four main objects in tree planting. First, commercial return, be the need for posts, railroad ties, construction timber or fuel. Second, to provide shelter belts or wind breaks. Third, road side and ornamental planting. And fourth, to extend and supplement the native forest in sections where the forest cover is unquestionably of value as a means of controlling the run-off and making available for use a larger percentage of the precipitation either on the surface or as an underground supply.

Let me speak of the last named case first. As a typical example I have in mind the Ewa Basin on this island. Practically all the water for the plantations about Pearl Harbor comes from streams draining the Koolau Mountains or from artesian wells supplied by underground water from the same source. The rain that falls on the Waianae Mountains is important as far as it goes, but it is and always must be only a fraction of what results from the precipitation on the Koolau Range. As it is now much of the rainfall on these mountains gets away as flood water and escapes the duty it might be made to perform, either by helping to fill the high level irrigation ditches or as underground water to assist in keeping up the water-table for a longer time in succeeding periods of drought. There is a belt above the cane fields and other agricultural land in the Ewa Basin that it would pay to get back under forest for the good it would do in holding some of the water that now escapes. The planting up of this belt is a case where all three plantations could well get together and coöperate. Needless to say the Division of Forestry would be glad to assist in any way possible in this or any other similar tree planting project.

I hope that in time the Division of Forestry may have at its command sufficient funds to begin tree planting again on Government land. But at present I believe more good can be accomplished by expending what money is available in assisting private owners and in the way of plant introduction.

During the past year systematic relations of seed exchange have been established with over one hundred botanic gardens and other similar institutions in various parts of the world. By this means there have been received at the Government Nursery the seed of numerous trees and shrubs new to the Territory, some of which are sure to prove of very considerable economic value. To facilitate this work an experimental garden has been made in upper Makiki Valley where the plants started in the specially constructed germination houses at the nursery can be propagated for subsequent distribution. As soon as practicable the new trees and

shrubs will be sent out to localities on the other islands where from situation, elevation and aspect they may be expected to do well. In addition to the experimental garden at Makiki, it is hoped to establish regular sub-gardens on the other islands, which shall eventually become centers of distribution. One such station is about to be made at Kalahea on Kauai where Mr. Walter D. McBryde has consented to coöperate with the Division of Forestry by overseeing the work. The great interest in tree planting that Mr. McBryde has already shown, both by his own planting and by what he has got his neighbors to do, argues well for the success of this undertaking. Eventually I hope that similar gardens for the systematic trial and propagation of valuable exotic plants may be established on each island.

Somewhat in line with this work is the experimental tree planting on the high slopes of Mauna Kea and Haleakala about to be undertaken with the coöperation of the Federal Forest Service. The object of these experiments is to try some of the conifers—pines, spruces and firs—of the temperate zone at elevations above the native Hawaiian forests, with the expectation of obtaining data that will lead eventually to the clothing of those now barren mountain slopes with a forest of valuable trees. An allotment of Forest Service funds made last year for this work was later withdrawn. This year the money ($2,000) was again secured. As soon as the necessary formalities are complied with the work of actual planting will be begun.

I said a few moments ago that there were four main objects in tree planting in Hawaii and proceeded to outline what might be done under one of them. Let us now briefly consider planting for commercial returns, which is far and away the most important form of tree planting in Hawaii. Every sugar plantation in the islands needs a constant supply of wood and timber. Many must provide for a supply of fuel as well. The price of all kinds of lumber, even of the ordinary rough grades, has for some years been going steadily up. From the outlook on the mainland it is evident that a further rise is to be expected. With the increasing demand for all forms of wood and the steadily diminishing supply the outlook cannot be otherwise. In his address before this Association at its annual meeting last year, Mr. Thurston brought forward facts and figures that cannot be disputed. The situation today is that we are one year nearer the time when the pressure of a wood famine will begin keenly to be felt. The only remedy is to plant trees and to begin at once.

Practically every sugar plantation in the islands has areas of waste land that is good for no other purpose, but which will serve excellently for producing wood of the kinds specially adapted for the needs of that particular plantation.

The Division of Forestry has the necessary information as to what kinds of trees to plant to obtain certain results under varying conditions of exposure, aspect and elevation. This information is free and to be had for the asking.

Further, at the bare cost of his traveling expenses, Mr. David Haughs, the Forest Nurseryman of the Division of Forestry, an experienced tree planter, long familiar with island conditions, will visit any locality and prepare a regular planting plan, showing in detail just what to plant and where and how to go about the work.

The cost of planting per acre varies of course with the locality. But there is probably not a plantation in the Territory where the planting of certain gulch sides or other patches of waste land with trees would not be a good investment.

A word on the personal side. Someone may object that tree planting is a thankless job for the man who does the work in that someone else enjoys the returns. Here in Hawaii this is less true than it is elsewhere for our trees grow rapidly and usually one has the advantage of being able to reap what he himself has sown. But supposing he does not. The members of this Association are broad-gauge men who should be glad to do something for the future welfare of the properties in which they are now interested, if not for the good of the country. And again, what better memorial can a man leave than a grove of thrifty, well grown, valuable trees. Think a moment of the tree planting that has been done in your district and ten to one you will find that some one man's name is associated with it.

According to a list that I made out last spring the following plantations are now actively engaged in tree planting, on a larger or smaller scale:

KAUAI.

McBryde Sugar Company, Eleele.
Koloa Sugar Company, Koloa.
Grove Farm Plantation, Lihue.
Lihue Plantation Company, Lihue.
Makee Sugar Company, Kealia.

OAHU.

Waianae Company, Waianae.
Kahuku Plantation Company, Kahuku.

MAUI.

Wailuku Sugar Company, Wailuku.
Hawaiian Commercial & Sugar Co., Puunene.
Maui Agricultural Company, Paia.

HAWAII.

Kohala Sugar Company, Kohala.
Halawa Plantation Co., Kohala.
Paauhau Sugar Plantation Co., Hamakua.
Hamakua Mill Company, Paauilo.
Hakalau Plantation Company, Hakalau.
Pepeekeo Sugar Company, Pepeekeo.
Honomu Sugar Company, Honomu.
Hawaiian Agricultural Company, Pahala.

This is a good list and means that the men who are responsible for the work are level headed and far sighted individuals. But the list should be much longer. It ought to be made a sort of Roll of Honor on which the names of all the plantations should appear. Why should this not happen before the next Planters' Association meeting? If you gentlemen will take the matter to heart it can be done. We are all interested in the continued prosperity of Hawaii nei. Will you not in this way help the Territory while you help yourselves by providing for a wood supply in future years?